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AN OFFICE DESIGN AND EMPLOYEE STRESS

**An office design that reduces employees' stress and increases
employee productivity**

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Eu Alicja Papierska, declaro que a presente dissertação / trabalho de projeto de mestrado intitulada “Na office design and employees’ stress” é o resultado da minha investigação pessoal e independente. O conteúdo é original e todas as fontes consultadas estão devidamente mencionadas na bibliografia ou outras listagens de fontes documentais, tal como todas as citações diretas ou indiretas têm devida indicação ao longo do trabalho segundo as normas académicas.

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RESUMO

Nos dias em que vivemos o espaço de escritório desempenha um papel significativo na liderança da vida da empresa e do empregado. A produtividade dos funcionários é um elemento fundamental do sucesso de qualquer empresa. Um ambiente global competitivo determina esse fenómeno. A produtividade do trabalhador pode ser notavelmente reduzida devido ao alto nível de *stress* ou devido às condições precárias do posto de trabalho que influenciam o bem-estar e a saúde dos funcionários.

O objectivo principal deste estudo é explorar técnicas de design de interiores que possam reduzir o *stress* dos funcionários e, ao mesmo tempo, aumentar a sua produtividade. Para o efeito, foi elaborado um projecto de pesquisa-acção. O projecto é composto por uma proposta de *design* de interiores para a empresa Kolanko, situada na Polónia. A solução de *design* é baseada na *Biophilic Design* com alguns elementos do *Activity Based Working*. O *Biophilic Design* é uma tendência no *design* de interiores que enfatiza o contacto com elementos naturais, nomeadamente plantas. Inúmeros estudos foram realizados desde a década de 80, mostrando os benefícios da utilização de técnicas de *Biophilic Design*. Estes elementos de *design* desempenham um grande papel na concepção de edifícios, casas e escritórios. O resultado da sua implementação é a redução do nível de *stress*, melhoria da produtividade, da criatividade, do bem-estar e da redução do número de absentismo no trabalho. Nos interiores das instalações das companhias são introduzidos elementos como “muros vivos”, compostos de vegetação adequadamente adaptados e de fácil manutenção, materiais naturais e o maior recurso possível à luz natural nas suas salas. Pesquisas de pesquisadores da Universidade de Queensland, na Austrália, mostram que, em escritórios cheios de vegetação, a produtividade dos funcionários aumenta em até 15%. Isso porque, entre coisas "naturais", nos sentimos confortáveis e temos a impressão de que estamos cercados por uma atmosfera caseira. As plantas produzem oxigênio e purificam o ar, reduzem a concentração de compostos orgânicos voláteis (VOCS). Eles também reduzem compostos orgânicos voláteis, como álcool e aldeídos, que são encontrados em materiais de decoração de interiores e materiais de construção. Isso é particularmente importante em salas de escritório, onde estamos cercados por equipamentos eletrônicos e impressoras que emitem substâncias nocivas. Muitas plantas até as absorvem, graças às quais contribuem para reduzir o risco de desenvolver asma, alergias ou até mesmo câncer.

O papel *do Activity Based Working* é combinar o local de trabalho com as necessidades do funcionário. Os tempos em que o trabalho de escritório era identificado com o fato de estar sentado atrás de uma mesa a executar meticulosamente uma tarefa confiada já passou. Hoje, requer muito mais atividade e multitarefa. Na mudança que ocorreu nos últimos anos, a revolução móvel teve um papel importante. Graças ao acesso à Internet, a implementação de tarefas confiadas é possível em qualquer lugar, a qualquer momento. A natureza mutável do trabalho influenciou naturalmente as expectativas e necessidades comunicadas pelos funcionários. O conceito de *Activity Based Working* pode se tornar a resposta para os desafios do ambiente de trabalho contemporâneo e, ao mesmo tempo, uma sugestão para aquelas empresas que ainda não valorizaram o papel do escritório na criação de seu próprio negócio. De acordo com estas suposições, o escritório, oferecendo muitos tipos de espaço correspondentes a diferentes necessidades, é uma ferramenta para o gerenciamento eficaz de uma equipa diversificada, através do uso de todo o seu potencial e capacidade de comunicação móvel.

As salas privadas, o *open space*, a sala de convívio, a sala de reuniões, o refeitório, o ginásio e a sauna da sede da empresa mencionada foram projectadas também de acordo com *Activity Based Working*. O espaço comum é projectado para aumentar a colaboração entre funcionários e reduzir o *stress* no trabalho.

A ergonomia do local de trabalho é um dos aspectos externos que afeta a qualidade dos serviços que a companhia oferece, bem como o bem-estar e a saúde - tanto física quanto mental. Um papel importante neste campo é desempenhado pela iluminação adequada. Afeta o trabalho do sistema nervoso, bem como o estado dos olhos e as habilidades perceptivas. Vale a pena conhecer os princípios básicos da iluminação no local de trabalho, isto é, onde os trabalhadores passam uma parte significativa das suas vidas. O fator básico que determina a qualidade de uma fonte de luz é a sua cor. A cor da luz produzida proporciona um clima e uma atmosfera diferentes. Ao determinarmos a cor apropriada da luz, determinamos o índice de reprodução de cor ("Ra", também chamado por CRI). Quanto maior o valor (o máximo pode chegar a 100), maior a quantidade de tonalidades naturais dos objetos iluminados conseguimos ver.

De acordo com a norma mais recente do Comité Polaco de Normalização (EN 12464-1), uma fonte de luz com valor inferior a 80 Ra não pode ser usada no local de trabalho - é um mínimo absoluto. A luz com um alto índice de reprodução de cor (mínimo 80) tem um efeito benéfico no bem-estar das pessoas no escritório e reduz a fadiga dos nossos olhos. De acordo com estes padrões, a iluminação da empresa foi pensada, assim como o

mobiliário ergonômico. Ao escolher o mobiliário de escritório, não apenas a sua aparência foi levada em conta, mas também a qualidade dos materiais de que são feitos e a sua funcionalidade.

Para entender melhor o espaço e as necessidades do empregado foi feito um questionário. Usando dados primários, tendo em consideração as expectativas dos empregados e dos empregadores, foi exibido um plano inicial. Antes de fazer o projecto, muitos livros e artigos foram lidos para melhor entender a importância do *design* no trabalho. Os melhores exemplos de *design* de escritório que surgiram na Polónia foram estudados e cuidadosamente analisados. Conhecer os projectos de escritório desenhados pelos melhores arquitectos foi um estudo necessário, e que, por sua vez, inspirou a continuação do trabalho de *design* para a empresa Kolanko.

Um edifício de dois andares com um armazém espaçoso foi construído em Chwaszczyno na Polónia. O novo edifício da empresa é dedicado a clientes individuais e arquitectos que desejam colaborar com a empresa Kolanko. A nova sede social da empresa aumenta substancialmente a satisfação dos clientes prestando um melhor serviço. Beneficiando de um *showroom*, os clientes poderão ver o produto antes da compra tornando a sua escolha mais consciente. As instalações e as exposições dos produtos podem facilitar a escolha do cliente e também inspirá-lo. Um escritório moderno é uma combinação de vinte anos de experiência com novas tecnologias na área de *design* de interiores. O principal objectivo do novo escritório é assegurar o bem-estar dos funcionários e prestar um melhor serviço ao cliente.

Existem muitos estudos que apresentam a influência do *design* do escritório sobre o stress e a produtividade (que sejam afectados) dos trabalhadores. A falta de preocupação com o *design* pode reduzir drasticamente a produtividade dos funcionários e pode contribuir para muitos problemas de saúde. Existem algumas técnicas de *design* que podem melhorar o trabalho, o fluxo de informação no escritório e o bem-estar dos colaboradores. No projecto da sede social da Kolanko, os móveis de escritório, as texturas, as cores e a luz foram cuidadosamente seleccionados para garantir melhores condições de trabalho. Existem alguns elementos chamados de distração positiva no projecto (o ginásio, a sauna, a área de refeições e a sala de convívio) que têm impacto na redução do stress durante o trabalho. As plantas e a visão de janela têm influência sobre o bem-estar e a criatividade das pessoas.

Palavras-Chave: Design de interiores, Activity Based Working, Design biofílico, Stress no trabalho, Produtividade no trabalho

ABSTRACT

We live in times when office space is playing a key role in company and employees' life. Employees productivity is a fundamental element of any businesses' success nowadays. A competitive global environment determines this phenomenon. Workers productivity can be remarkably reduced by high level of stress and poor quality of interior. Both stress and bad working conditions have an influence on employees' well-being. In addition, they can result in pain and health problems, which as a result can reduce the willingness to work.

The main aim of this study was to explore interior design techniques, which can reduce employees' stress and at the same time increase their productivity. For this purpose, an action-research project was made. The project is composed of a design proposal for an interior design company in Poland. The design solution is based on Biophilic Design with some elements of Activity Based Working. Biophilic design is a trend in interior design that emphasizes contact with nature. By using this design techniques (plants introduction, sunlight, nice window view for the greenery), it is possible to make workers feel better and at the same time to make them more creative and productive. The role of the Activity Based Working assumption is to match the workplace to the needs of employee. The private and open space, creative room, meeting room, dining room, gym, sauna are designed according to Activity Based Working. Common space is designed to increase collaboration among employee and to reduce the work stress. Ergonomic furniture and introduction of plants are the elements which increase productivity and protect health of both employees and customers .

To understand the space and employees' needs better a questionnaire was made. Using primary data, taking into consideration employees' answers and employers expectations a functional layout was designed. Before doing a design, many books and articles were read to understand an office design subject well. The best office design examples, which came into existence in Poland, were studied and carefully analyzed. Getting acquainted with office projects designed by the best architects was a necessary study which inspired me to continue a design work for Kolanko Company.

Two-storey building with spacious stockroom was built in Chwaszczyno in Poland. The new building of the company is dedicated to individual customer and architects who want to collaborate with Kolanko Company. New headquarters of Kolanko company may help clients enjoy a better service. Thanks to the showroom clients

will be able to see a product before the purchase which makes their choice more conscious. An installation, products exhibitions can facilitate the client's choice as well as inspire them. The modern office is a mix of twenty years of experience with new technologies in interior design area. The main purpose of new office is to provide the best condition for employee's well-being and client's service.

There are many studies, which present the influence of office design on workers' stress and productivity. Poor design can dramatically reduce employee productivity and may contribute to many health problems. There are some design techniques, which can improve work, information flow in an office and well-being of employees. In the project of Kolanko headquarters, office furniture, textures, colors and light, were carefully selected to ensure better working conditions. There are some elements called positive distraction in the project (gym, sauna, dinning area, creative room) that have an impact on reducing stress during work. Plants and the window view have possitive influence on state of being and people's creativity.

KEY WORDS:

Interior Design, Activity Based Working, Biophilic Design, Stress at work, Productivity at work

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1. INTRODUCTION

Today's business environment is changing rapidly. Because of highly competitive business industry, offices have to be multifunctional, comfortable and inspirational (Marilyn, 2007). They are starting to offer employees a variety of spaces for both work and leisure. Nowadays more and more people among a business industry start to understand that human capital assets (the employees and the intellectual value) is a key component to company's success. Employers are trying to meet the needs of workers and give them flexibility. They are focused on teamwork, collaboration, information flow and productivity.

A modern and inspirational office is recognized as one of the most important criteria for choosing a job (after salary or professional development). Office design is very important, it is not just superficial add-on, or an extra budgetary caprice. The design becomes the business, and gives opportunities for company's growth. A creative office space is the essential element in motivating and engaging workers. Well-designed office with right ergonomics can improve productivity of staff and also the profitability of the company (Marilyn, 2007).

With the increasing emphasis on employee productivity, the risk of stress is rising. Exposure to a permanent work-related stress is a reason of many health problems. It has a bad influence on employee's physical and emotional well-being. It can also cause a work burn-out. Consequently workers are less productive and they are absent from work more often due to work-related stress (Catwright, 1997).

According to the results of the European Employment Surveys conducted by the European Agency for the Improvement of Living and Working Conditions (Eurofound) in 2010, more than 36% of employed Poles said that work negatively affected their health. This percentage is one of the highest in Europe. Year by year absenteeism costs Poland and Polish entrepreneurs more and more. Experts (including Medicover) counted the costs of bogus sick leave and absences at work. Due to the employees sick notes employer loses even PLN 1,477 per year (data: 2014). In 2013, the cost of sickness benefit exceeded PLN 13.3 billion¹. Absenteeism, less productivity and stress are a main risk for many businesses.

¹ Statistics do not include other financial expenses associated with absences (remuneration for overtime, replacement of the employee, cost of administrative redundancy, recruitment, training of new employees). 13 billion polish zloty is approximately 3 billion euro.

To deal with the work-related stress, first of all employers must identify the specific sources of stress (Allie, 1996). After having recognized the source, they are able to find solutions. One of the major areas, which can be improved to reduce employee's stress, is the office workspace design. Vangen (1999) notes that good office design can be an effective factor to reduce employees stress and to increase productivity.

There are numerous well-studied techniques that can be applied in an office, including ergonomic furniture, natural light, plants introduction, relaxing zones, office gym, dining area, appropriate colors. Concepts such as Activity Based Working, Coworking, Biophilic Design seem to respond best to the challenges of the contemporary times, when working environment is dynamically changing. According to the specialist Walter Harz, the projection rooms are a good idea in office design. It is a space where employee can write on the walls and boards, where there is a possibility to attach notes from the discussion in various places, for example, on the move. Created ideas are used at work because the imagination and visual memory are more effective than the auditory memory.

Nonetheless, improvement in interior design is not enough anymore. Employees increasingly value access to the attractions in the office and its surroundings. Employers are trying to develop office functions. There are not only conference, event and catering areas, but also fitness clubs, medical facilities, kindergartens, parking area for bicycles and points to repair them. In some offices, it is possible to find so-called urban backyards where workers can join team games, work out in the open air or watch a movie in fresh air, summer cinema.

Primarily an office design should have a good influence on employees' well-being and their productivity. Their welfare should be in the first place. Happy, creative worker can provide a good service and can be a flagship. Best working conditions for the employee are reflected in customer satisfaction.

However, it is important to keep in mind that research on productivity and employee's stress is still ongoing. Moreover, there are many aspects which required further research.

1.1 Research Problem

The objective of this study therefore is to explore the design techniques that reduce employees' stress and increase their productivity. Moreover, these elements will improve information flow and collaboration between workers. Office design will increase

employee productivity and creativity. Consequently, by using such elements as good acoustic, natural light and appropriate indoor air quality employers can contribute to creating the optimal working conditions.

The research paperwork was made to fulfill the following objectives:

- to analyze the factors of office design which could reduce employee's stress
- to analyze the factors of office design which could increase employee's productivity
- to find a design solution to improve the performance of employees
- to understand other employee's needs
- to analyse the company 's features and identity

The main aim of the study is to design an interior for a new headquarters of Kolanko company. This company offers comprehensive interior design services. The main purpose is to offer a professional service. One of the activities of the company is the sale of interior furnishing materials. Till now the only possibility to buy a product from this company was an online shop. Thanks to new office, there will be a stationary shop with a showroom, which allows clients to see product first.

The building and architectural industry is known for its extreme deadlines. Employees of Kolanko Company work in stressful environment, where delays in contracts can result in large penalties for the company.

1.2 Metodology

This study used both qualitative and quantitative methods. Data collection approaches for qualitative research involved interview with employers of KOLANKO Company as well as questionnaire and observation.

Quantitive methods included secondary data such as reports of Polish companies, books, magazines, and articles about stress and productivity at work.

Programs such as Archicad and Artlantis as well as programs for graphic design like Photoshop were used for the project.

2. STRESS

2.1 What is stress?

Stress has always been in human life and the only factor which changed over the

centuries is the way of dealing with it (JEFFERSON, 2017). The term stress is defined in Oxford Dictionary as a state of mind, tension, anxiety which is caused by unfavorable circumstances. The first person who created the definition of stress was Hans Seley in 1936. He explained stress as „non-specific response of the body to any demand for change” (1956). Gina Lake (2013) extends Seley’s definition further by stating that stress is a reaction of organism to different situations considered as a challenge or threat. It can be both a real situation or the perception of it. Stress is a result of believing what our inner voice tells us. Usually it is a feeling of fear, panic judgment or negative emotions.

The mechanism of body reaction is complicated, connected with nervous system. Under the influence of stress, an organism produces more substances among others adrenaline, which improves the body performance but only for a short period. Heart beats faster, blood pressure rises and breathing gets heavier and as a result more oxygen is released into the cells. On the other hand persistent anxiety and pressure can ruin concentration and cause many health problems. Everything depends on how long an organism experiences stress. Experts categorized stress according to frequency and period. Short-lasting is called acute stress, while long lasting is called chronic stress. The first one pertains to events and after resolving them everything comes back to homeostasis. It lasts shortly so there are no harmful changes in a body. Contrary to acute stress, chronic stress destroys the body and mind and it is extremely dangerous. It appears when the solution of problems cannot be founded. Usually it is a result of traumatic situations, which although happened in the past there are still painful and have impact on the presents (LAKE, 2013).

It is said that there are three categories of stressors: harm or loss (when the event has already occurred), threats (anticipated situation) and challenges. These last are one of the major stressors people face in their life. Already in the seventies of the twentieth century, Dr. Thomas Holmes and Richard Rahe paid attention to the impact of individual life changes on the risk of developing a serious illness. The result of their work was the scale of „life change units” (table number 1) which allowed to determine the amount of stress associated with the change (KISIEL-DOROHINICKI, 2012).

LIFE EVENT	VALUE
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DEATH OF A SPOUSE	100
DIVORCE	73
MARITAL SEPARATION	65
JAIL TERM	63
DEATH OF A CLOSE FAMILY MEMBER	63
PERSONAL INJURY OR ILLNESS	53
MARRIAGE	50
DISSMISSALS FROM WORK	47
MARITAL RECONCILIATION	45
RETIREMENT	45
HEALTH PROBLEMS OF FAMILY MEMBERS	44
PREGNANCY	40
SEX DIFFICULTIES	39
GAINING A NEW FAMILY MEMBER	39
BUSINESS READJUSTMENT	39
CHANGE IN FINANCIAL STATES	38
DEATH OF A CLOSE FRIEND	37
TROUBLE WITH IN-LAWS	29
SPOUSE BEGINS OR STOPS TO WORK	26
BEGINING OR ENDING SCHOOL	26
CHANGING IN LIVING CONDITIONS	25

CHANGES OF PERSONAL HABITS	24
TROUBLE WITH BOSS	23
CHANGE IN WORK HOURS	20
CHANGE IN RESIDENCE	20
CHANGE IN SCHOOLS	20
CHANGE IN RECREATION	19
CHANGE IN CHURCH ACTIVITIES	19
CHANGE IN SOCIAL ACTIVITIES	18
CHANGE IN SLEEPING HABITS	16
CHANGE IN EATING HABITS	15
VACATION	13
CHRISTMAS	12
MINOR VIOLATIONS OF LAW	11

Table 1. Life change units written up by Dr. Thomas Holmes and Richard Rahe

In the middle of the table there are stressors which are related to work. Most employees experience stress in their daily life. According to the International Labor Office, 75% of workers in Europe claim that they suffer from stress at work, 30% quit job their because of stress, and 85% of the employees suffer from this problem. Stressful work makes it difficult to maintain talented employees, reduces initiative, creativity, commitment and motivation, increases absenteeism.

The degree of intensity is different but excessive stress has an influence on all workers and their emotional and physical well-being (LAKE, 2013). Lake (2013) notes that office design is one of the major factors, which can help reduce stress. In the interest of comfort and better employees' productivity, the company introduces noise-reducing acoustic panels and partition walls to reduce noise. There are sailent work zones, but also relaxation areas, cafés, libraries and game rooms. It gives a possibility to break away

for a moment from entrusted tasks and take a distance from them. It has been proven that allowing employees to relax during working hours increases their productivity and relieves stress.

2.2 Stress and health consequences

Both acute and chronic stress have always had an effect on the body. It is not true that stress will always worsen well-being and lead to illness. Very often it stimulates to action which in consequence allows to realize dreams and ambitions. This means that stress can not only be a burden on lives, but also an additional stimulus which can let us fulfill even the most difficult tasks (KISIEL-DOROHINICKI, 2012). However long-term stress can cause many damages in a body and lead to illness. People under stress are more vulnerable to viruses and bacteria and they are sick more often because the immune system is impaired (LAKE, 2013).

Work-related stress is not a disease itself. It is a human response to the demands of work. However, when the level of stress which employees experience is high, lasts a long time, their motive is not removed, it can have negative effects on health, it can lead to various diseases over time (FERRIE, 2004). Jefferson lists a number of health problems caused by stress such as headaches, insomnia, anxiety, depression or high blood pressure. He also emphasizes that stress can be linked to some serious diseases like stroke and heart attack. That is why, it is so important to prevent stress situation, to recognize the sources and to deal with them.

2.3 Stress in the work environment

Work is unquestionably related to stress. Without stress there is no life, as well as there is no stress-free job. Employers in any kind of a company experience stress, which is a result of many different stressful areas like relation with other workers, condition or character of work. Despite the fact that word stress has a negative connotation, it can contribute to the increase of effectiveness and it can be motivating (KISIEL-DOROHINICKI, 2012). However long-lasting stress can lead to burnout and even depression (JEFFERSON, 2017).

There are two different sources of stress at work. It can be both physical stimuli such as noise, inappropriate lighting, too high or too low temperature and psychosocial

stimuli (KISIEL-DOROHINICKI, 2012). In his work Świderski created an questionnaire and asked employers, which are the most popular sources of stressors at work. At the top of the list there are work noise, possibility of losing a job, responsibility for the health, life, future of other people, a must of contacting "unhappy customers," continuous availability, conflicts, labor disputes, physical abuse, threats, intimidation of a employee. The psychological stressors cannot be terminated by good design, but all physical can certainly be.

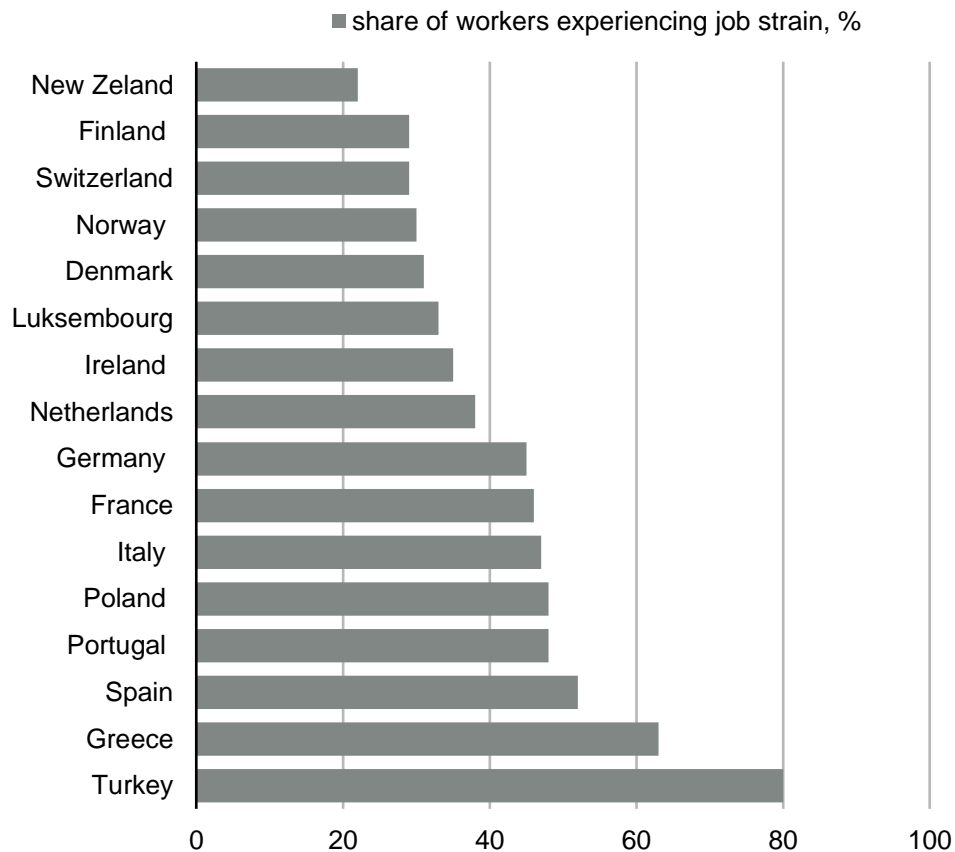


Diagram 1. Stress factor in different countries in the world. Study based on the 6th European Working Conditions Survey (forthcoming) for 2015.

Source: OECD Job Quality Database (2016), based on the 6th European Working Conditions Survey (forthcoming) for 2015.

Turkish employees are (Diagram 1). Many residents of Greece and Spain also experience job strain. The rate of tension among Poles and Portuguese is significantly higher than among employees from Scandinavian countries (Finland, Norway, Denmark), Luxemburg or Switzerland. New Zealand is considered as a country, where workers are the happiest in the world.

2.4 Economical consequences of stress

Job-related stress can have a serious economical consequence. Andrzej Świdorski (2006) talks about damages worth about 20 miliard. euro per year in European Union. The researches made in European Union show that 50-60% of not overworked days are related to stress. In the UK alone, the number of days per year not worked because of stress is estimated for 40 million. Employee's behavior which is a result of constant stress can cause catastrophic losses for business. Employees who work under pressure are unable to work effectively and efficiently, which in turn contribute to committing unintentional mistakes. Because such people are distracted at work, it is more probable that they can get injured. After some period, employees can feel a job burnout, and lose their interest to work. More often, they can run afoul of a supervisor, boss, and will not execute their commands. Because of the chronic stress workers often take days off and they are very reluctant to all changes and innovative ideas at work. Finally, feeling of continuous stress can be a reason of giving up a job. A company pay for all these result of employee's stress, for therapy, for their mistakes, for training course for new workers. Because of the possibility of losses, the companies and their bosses should take action in order to assure that the workers the best working condition to reduce feeling of stress (DUDEK, 1999).

3. PRODUCTIVITY AND A WORKPLACE

3.1 Productivity in the work environment

Anna Kosieradzka (2012) explains employees' productivity as an assessment of workers efficiency at work determined by time. It is hard to define the term productivity but it can be measured by comparison of employee's work to average of work done by other employees who do similar job.

Productivity has an important role in success of any companies. If employers want to be successful they have to be sure of good conditions at work. The main purpose of any office design is to ensure the best condition and maximum satisfaction to occupants both employees and clients. Juriaan van Meel (2010) lists some office purposes such as functional, social and symbolic function. Using design techniques, it is possible to inspire, motivate, boost interaction, increase productivity and reduce stress.

First of all, it is essential to assure about basis ergonomic standards as climatic conditions (temperature, air humidity), proper lighting and acoustic comfort. As Juriaan van Meel (2010) emphasizes these factors do not stimulate creativity so much but lack of them could have negative impact on employees.

3.2 Modern workplace

The working environment is constantly changing. Whole world including Poland is undergoing a transformation that brings younger generations of workers and modern technologies to the market (WALENDA 2017). Walenda in her article explains that nowadays, the main purpose of office design it is not to have as many employees as possible in an office area, but to bring out potential and talent of employees which result in using their working time in the most effective way. The offices are primarily dedicated to collaborative and creative interactions. Times, when office was a small area with artificial, fluorescent light surrounded by white walls and equipped with many cabinets, are already gone. The companies like Google and Pixar set trends and prove that unconventional work environment very often helps companies to achieve better results (POCHEPAN 2017).

In 2016 a Facebook company established an office in Poland. The headquarters are located in Warsaw in office building called 'ROUNDABOUT ONZ'. Whole space is on the 11th floor and it is all glazed overlooking the Warsaw. The office is designed according to the open space principle. Spacious open areas allow fast and smooth flow of information and good communication between employees. The main idea of design is to show different nationality of people who work there. Everybody who comes into

the office is able to figure out that the office is situated in Poland and employees are from different countries in east Europe. The main color of Facebook is blue. In the Polish office it also appears, mostly on the walls in a graphic form. According to idea of nationalism almost all furniture as well as graphics are designed by Polish designers. Acapulco Studio is an author of all graphics which are placed in Facebook office in Poland. Furniture like sofa is made by Pan Popi and lamps are designed by Puff-buff. An interesting fact is that there are no closed ceilings in Facebook all around the world. It is in a raw form. This is the purpose to subconsciously send a signal that "Sky is the limit". The pillars have been used in an interesting way too. They are assigned to the most important Central and Eastern European countries where Facebook has its headquarters: Poland, Czech Republic, Hungary, Romania and Russia. For visitors there is also a place where they can register their visit to the company - a large wall, where all visitors can sign using a colorful pen. The kitchen as well as workstations are in the open space style - these are a place which surprise with colors and functionality. Apart from open space where all employees work together there are some private rooms and meeting rooms, where workers can sit in silence and where they can meet their clients. Every detail in the company is carefully planned and designed. Everything to ensure the best working conditions for employees as well as to attract the most talented people and encourage them to work for the company (Bień, 2016).

From 2010 the offices became multifunctional, comfortable, inspirational areas which began to offer employees a variety of spaces for both work and leisure (GATTERER, 2009). The modern office is a space which impresses with its originality and interesting design. In addition to traditional office spaces and meeting rooms, a variety of different areas are created to facilitate faster and easier communication. Spacious cafeterias and restaurants where employees can dine, have a cup of coffee, but also organize a meeting or a workshop. Offices are becoming more functional and friendly to employees. Many of them have nooks with comfortable armchairs and sofas where people can meet, talk and rest. The modern office today provides not only very good working conditions but also for employees. The interior design is a very important element. If it is planned well and coherent, it becomes a tool for the company to create its own identity and communicate its values (DOORLEY, 2012).

3.3 Activity Based Working

Young people work in a completely new style of work based on features such as multidisciplinary and remote work. They use several devices simultaneously. In the near future it will significantly have influence on the model of business (Diagram 2).

The activity based working (ABW) concept makes the office a flexible space that adjust to the users and to the character of their activities. Employees are given the opportunity to make a conscious choice of the space that fits their tasks and preferences. Working in such environment gives them freedom and autonomy which are essential to feel sense and satisfaction from work (WALENDA, 2017).

The ABW concept is particularly attractive for the company if department's and team's work is characterized by a large number of meetings. The nature of the work of some departments requires frequent telephone conversations, and at the same time it is important for them to work in the focus. Significant number of meetings in the company are informal, spontaneous and creative. The company's employees need more solutions to work than their own desk and traditional conference room.

Young people want to travel, develop, gain experience. They value flexibility and mobility. Employers who respond best to their expectations will gain a significant advantage in the talents battle. What companies can do right now is to customize both office space and work. It is possible thanks to modern tools that allow to carry out employees' tasks from office, home, park or any other locations - even at the other part of the world.

Nearly 70% of employees noticed that working in an activity-based environment adds energy, improves performance and is more stimulating. To respond to the employees' needs is a great benefit, not only for the personal satisfaction but also for the employer branding and financial profit. Implementing changes in the work environment will help to strengthen the teams and improve their effectiveness.

Employees will be more engaged, independent and satisfied with their working life. In addition, being open to innovation means that employers are more likely to acquire and retain talented specialists into the structure of their company. Already 88% of respondents in Poland are considering the use of office space as a tool to support the

image of an attractive employer (Raport).

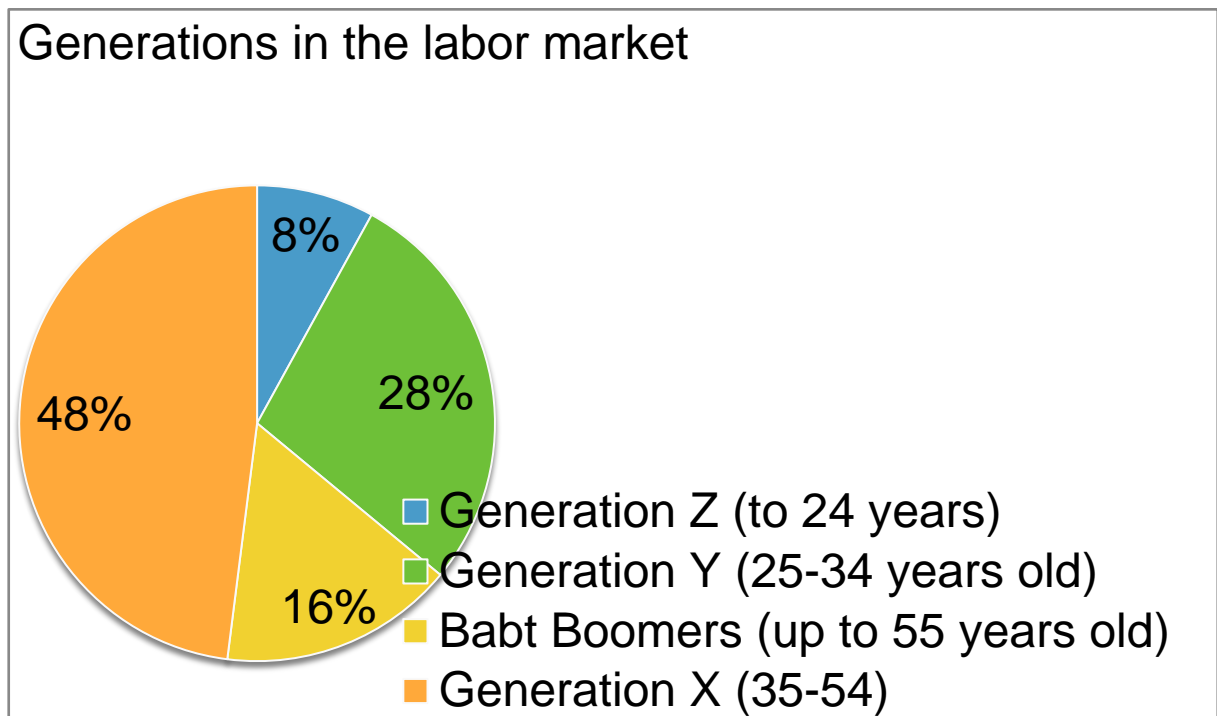


Diagram 2. Percentage breakdown of age groups in the labor market

3.4 Ambient influence on productivity - ergonomics

The term ergonomics was coined in the 19th century by the Polish naturalist, professor Wojciech Jastrzębowski. The word ergonomics means "study of work". It is a practical field of science that deals with the adaptation of work to the psychophysical capabilities of man. Ergonomics also explains what an employee should do in order for to perform his or her duties at the lowest biological cost while achieving high performance and efficiency. The purpose of ergonomics is to improve the working conditions of a human, which in turn will improve the quality of his work (JANIGA, 2014). On the diagram 3 there are list nine different factors which have influence on approach to work.

There are many jobs nowadays which require people to be in the office all day and to sit while working. Uncomfortable seating can lead to discomfort but also many

serious diseases, back pain or upper limb disorders. All these problems with employee's health can bring about financial loss to employers because of the workers absences, reduced productivity and potential civil claims.



Diagram 3. Factors which have influence on approach to work

Source: Raport (annexes page 113)

Work comfort is strongly influenced by the chair, which should provide a comfortable body position and freedom of movement and be equipped with seat height adjustment about 40-50 cm from the floor. The size of a seat has to meet the needs of a different type of users, tall as well as short. Wide enough for larger people, deep enough for tall ones to support their legs and at the same time not too deep otherwise shorter employees who would not be able to use the backrest (figure 1). The best seats have adjustable backrest height and tilt adjustment backrest. There are equipped with armrests and the front edge is rounded-over to prevent hurting thighs. It is much easier to get up and change the position if the seat is not hollowed and deeply shaped (HSG57).

The second most important furniture in the office is desk. It should be wide and deep enough to allow the workstation equipment to be positioned at the right distance from an employee. The purpose is to prevent the adoption of forced positions. The monitor should be positioned on the desk at a distance of 40-75 cm from the eyes, ensuring that the viewing angle of the screen is 20 ° - 50 ° down from the horizontal line at eye level. Such a workplace organization will minimize the strain on the eyes and the neck.

Human contact with the environment plays an important role in the organization of work, because about 80% of the information is received by the eye and the remaining 20% by hearing, touch and other senses. For proper contact two factors are necessary: an efficient eye organ and specific lighting conditions. Optimal light conditions are defined to the following ratio: sufficient light intensity, correct distribution of shadows, the right color of light, luminous flux stability, no glare. One of the lighting ratios is illuminance measured in Lux. 500 Lux is a minimum level required for the brightness at computer work stations. It is said that the higher ratio of illuminance the better. An illuminance between 500 and 1000 Lux is considered as a stress-free. (Janiga, 2014). Other factors which have influence on quality of light is glare and shadows. They might arise in rooms where both natural and artificial light is used. Placing artificial lights parallel to the window is the best way to avoid these effects.

Scientists have proven that too little light can cause depression. It is important to make sure that the natural light is used in the workplace. Sunlight is the most favorable type of lighting, and at the most economical (Hardy, 2016).

Color temperature should be higher than 3300 Kelvin - cool white light color has a positive influence on the concentration. An indicator of color rendering (Ra) is also an important factor. The higher index (max 100), the colors of the items look more natural. Polish standards recommend light sources equal to $Ra > 80$ for offices.

According to the regulation of the Minister of Labor and Social Policy on general health and safety regulations in the work areas where light work is done, and in offices, the temperature cannot be lower than 18°C . The humidity in the room should be between 40-60%. If the humidity is lower it can cause red, dried eyes, dried nasal mucosa, dry, flaky skin, if it is much higher, in the office can develop fungi and mites.

Noise means sounds that disturb or foreclose the performance of work in a given office and there are undesirable and harmful to health. The greatest physiological and psychological effects of noise on the human organism are: sound frequency, measured in Hz (Hz), sound intensity, measured in decibels (dB), sound volume, expressed in phonics. Intensity in excess of 75 dB may be harmful, and noise levels above 115 dB significantly increase the risk of hearing loss even at a single, short-term exposure. A severe pain and dizziness, confusion and nystagmus were observed at high level of noise.

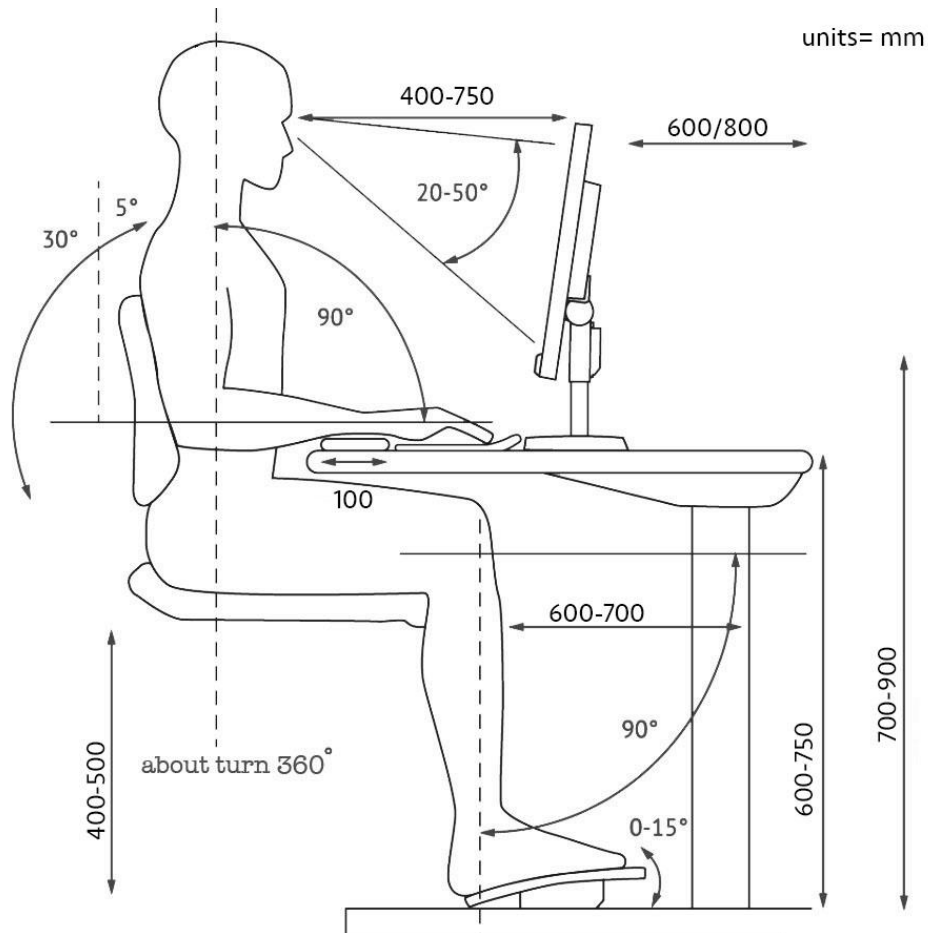


Figure 1. Ergonomic seating

3.5 Biophilic design

Biophilia in literal translation means "love for nature". This term was popularized by American biologist Edward O. Wilson who noticed the process of moving people from rural to urban areas. Biophilia refers to human fascination with nature and its processes. Living in harmony with nature is people natural heritage. It has only been 150 years since society is more urbanized and as a result people lose direct contact with nature, which in turn affects health and well-being.

Many studies have been conducted since 1980s which show the benefits of biophilic design. These elements play an important role in the design of healthcare buildings, homes and offices. The result of their implementation is reduction of stress, improvement of productivity, creativity, well-being and reduction of absenteeism at work - says Chen-Yen Chang.

This year, a strong trend in an office design related to nature can be easily seen. Jeff Pocheban says that salvaged wood, as well as green walls and outdoor office

extensions are often found in workplace nowadays. Keeping a plant on an office desk is not enough anymore. Biophilic design is a new way of designing the space (POPCHEPAN 2017). The main idea of Biophilic design is simple, to live as close to nature as possible. Edward O. Wilson, Harvard biologist convinces that being in touch with nature brings people mental, emotional and health equilibrium.

The most prominent representative of the biophilic design in the area of urban design using a biophilia is Stephen Keller, a prominent urbanist and sociologist from Yale University. There are some common elements for this trend such as: natural light, pure, fresh air, a lot of space, water, natural building materials and of course greenery plus decorations which refer to the natural world (KELLERT, 2008). There are more of test results which show that people are in better mood, they learn faster and work better if they are surrounded by nature. Mind works efficiently and the psyche is more stable. Dadvand Payam and his team ran a test in 2015 in Barcelona. Around two and half thousand children from different primary schools were a subject of the test. Payam studied the number of trees and density of the crown of trees in the neighborhood of school, in the route from children's house to school and in the area where they live. The researcher proved that the greatest amount of green spaces near schools and houses result in the greatest physical and cognitive development in children.

There are many other researches showing positive influence of biophilic design on different aspect of human life. The ratios with which Chen-Yen Chang and Ping-Kun Chen (2005) measure the effect of pleasant window-view and introduction of plants was: electromyography, electroencephalography, blood pulse, and state-anxiety. The study has shown that indoor plants as well as window-view can significantly help with stress, change state-anxiety and reduce muscle tension. Another research was made on a group of people after surgery on spine. The researcher proved that patients who were in the hospital room designed according to Biophilic Design took one-quarter less painkillers comparing to people who were in normal hospital room (URLICH, 1991).

The statistics published recently are not very optimistic: almost one in two workers has no access to natural light at all in their office. Nearly 60% of questioned employees admitted that there were no plants in their workstation. The employees answered for a question: 'What do you really need and what would make you happier in an office taking into account of office design?': natural light (44%), office plants (20%), sea view (17%), bright colors (15%) and silence in the work area (19%). Meanwhile, research shows that 67% of employees feel happy in bright offices with appropriate color

accents - blue, green and yellow. Daylight and plants can make workers 15% more creative and more productive. A study conducted in the USA also showed that for people's health they should have access to pleasant views from windows. Employees who could look outside the window deal with everyday stress much quicker than those who could only stare at the empty wall.

Researchers recommend no fewer than one pot plant per one square meter of office space. In addition, you can set a small pot near the monitor and other equipment emitting harmful substances. To create the most optimal conditions, it is assumed that 3 medium plants should be per 1 employee.

Nowadays employees are conscious of their needs. They often know exactly how their office should look like and in which place they can feel comfortable and well. One third of workers admit that the appearance of a workplace can influence whether they accept the job offer or not.

In the work environment, the office design is a psychological contract between an employer and an employee and it is something that differentiates the brand from the other companies on the global market. All the biggest companies in the technology sector such as Facebook, Apple, Google, are known for providing great working environments, which are linked to nature through biophilic design. With the increase of awareness amongst employees about leading companies' approach to designing work environments, biophilic design can be considered as a crucial component in 'the war for talent'. It is a tactic which companies use to attract and retain the most talented, productive workforce with a great success.

3.5.1 Plants influence on employee productivity

Employees mostly complain about headaches, problems with concentration, eye fatigue, problems with throat, dry skin (especially on the hands). And on top of that list there is coughing, nausea and constant tiredness. These complaints are repeated in various research papers - so it cannot be employees' fault. The environment where employees spend most of their day has a huge impact on their health. Air conditioners and radiators make the air dry. Computer monitors, printers, copiers emit acetone and trichloroethylene which adversely affect worker's well-being (DANNENBERG, 2011). There are many benefits of using plants in an office such as increasing productivity, purifying indoor air or reducing stress.


The study conducted at University of Queensland in Australia shows that it is possible to improve the air quality within the office using merely one plant per three workers. The same ratio of plants can reduce carbon dioxide as well as dust, bacteria and toxins (acetone and trichlorethylene).

Dr Chris Knight from Exeter University proved that introduction of plants in an office can increase productivity even by 15% and reduce stress. Plants create a nicer office and ensure a comfortable workplace. Ratio of illnesses and absences is significantly lower at companies with plants introduction. Another advantage of plants is reduction of noise which affects better concentration (ULRICH, 2001).

Cindy Dreyer (2017) lists the best indoor plants for offices. On the top of the list there is a Spider Plant (*Chlorophytum*). This plant is easy to grow and has good air purifying properties. Another plants recommended as an air cleaner in a group of non-flowering plants: Umbrella Plant, Snake Plant, Jade Plant, Ponytail Palm, Aralia Plant [table no 2]. *Sansevieria trifasciata* is a plant which produce the biggest amount of oxygen. It is not a novelty that a well-oxygenated organism is more productive than less oxygenated. What is more, it clears the air form CO₂. Six to eight plants per person are able to provide clean air in a closed room. There are also many flowering plants which can be grown easily and can decorate office. This group includes, among others African Violets, Calla Lilly Plant, Azaleas, Jasmine, Bromeliad [table no 2].

Office plants should be chosen taking into consideration not only their appearance, but also their requirements. The best indoor plants for the office are those that do not require too much care and are not particularly sensitive to care errors. The table number 2 shows the species which are the best choice for an office.

Plants increase the sense of security. They have positive influence on well-being of workers, calm down, soothe nerves, and mobilize at the same time.

ENGLISH NAME	LATIN NAME	PICTURE	CHARACTERISTIC
Spider plant	<i>Chlorophytum comosum</i>		One of the easiest plant to grow. It purifies the air from steroids, formaldehyde and CO ₂ . one such plant can purify up to 200 square meters.
Umbrella plant	<i>Schefflera arboricola</i>		The plant is very valuable due to its ability to absorb chemical impurities from the air.
Snake plant	<i>Sansevieria trifasciata</i>		In addition to eliminating toxins can also produce oxygen.
Jade plant	<i>Crassula ovata</i>		In China it is considered to be a plant that disperses bad energy.
Ponytail Palm	<i>Beaucarnea recurvata</i>		Alternative for cactus. It can be placed on a sunny windowsill and near a radiator.






Aralia Plant	<i>Araliaceae sp.</i>		Easy to grow.
African Violets	<i>Saintpaulia</i>		Flowering all the time.
Peace Lily	<i>Spathiphyllum</i>		It absorbs formaldehyde, which is found in tobacco smoke. It can be placed near smoking room.
Boston fern	<i>Nephrolepis</i>		This plant should be planted in small pots near monitors, on desks because it negatively ionizes air.
Wondering Jew Plant	<i>Tradescantia</i>		The plant helps to get rid of xylene and toluene from the rooms

Table 2. Plants characteristic

4. OFFICE DESIGN

4.1 The evolution of office design

Over the last hundred years the style of office design has evolved, and for sure the importance of design increased. What is more, even in the last ten years there have been many changes, easily observed in office's interiors. The most significant design change is an idea to create a space which reduces stress and increase productivity of an employee, because employees and their well-being are the most important factors in office design nowadays. The infographic below (figure 2) chronologically presents the evolution of office design (NIEZABITOWSKA, 2011).

At the end of the 19th century, the word 'employee' was related to machine. Offices were designed to accommodate the biggest amount of workers. The most important was a product and the quantity of production. This kind of office model was focused on manufacturing a product.

Wooden desks and chairs were used for the first in UK. In 1714, British engineer Henry Mill obtained a patent for the design of an instrument that can print separate letters. The author of the practical typewriter is the American, Christopher Latham Sholes, who (in cooperation with Carlos Glidden and Samuel W. Soule) constructed in 1867 its first useful model. But the first machine appeared in 1957, which was a combination of an electric machine and a suitcase machine. It was sold by Smith Corona of Syracuse, New York. For an office design it meant that more space it was required for an employee to put a typewriter on a desk. This was also the time when swivel chairs became popular. The inventor of an office chair with a rotating around his own axis seat is considered the third US president Thomas Jefferson. It took place in 1779. Since then, more and more bolder projects have been introduced, enriched with new functional solutions. Today, the massively popular office swivel chair no longer surprises anyone, it has become the driving force of countless army of office workers, offices and more.

The turn of XIX and XX century is a women time. From Antiquity, through the Middle Ages to the Renaissance, women had fewer rights than men, and We could even say - they did not have them at all. From 1940 there were more and more women in the offices due to introduction of constitutes equality between women and men (Lisowska, 2008). The most characteristic elements of office design in 40's are: bright lights, white as a clinical space. The most popular ceilings material used to absorb the sound was

cork.

1950 and 1960 are years of further development and modern technologies. Materials such as steel and glass were used in office interiors as well as air-conditioning and fluorescent lighting. Open space was a main trend in office design but from 1950 it was modified by movement called Bürolandschaft (landscape office). This approach assumes healthier, better conditions. Patterns changed from geometrical into organic form. Area is loosely divided with plants or furniture, which allows for easier interaction between teams.

A big breakthrough in the field of office design was in 1969 when Hans Hollein created an inflatable mobile office. One of the biggest surprises was that the office could be moved and assembled practically anywhere. It was kind of prototype of laptop.

Another icon project of office design is Johnson Wax Headquarters, a headquarters and administration building of S. C. Johnson & Son in Racine, Wisconsin. This building was designed by American architect Frank Lloyd Wright. In fact, the headquarters of an American company is not a traditional building. More than an office building, it resembles a huge university campus, with long corridors and spacious halls that overlook the garden. The construction of bricks and glass owes its particularity to the extraordinary sculpture that welcomes the coming guests: a huge globe with a base made of bronze, whose colors refer to the color of the earth and shades used to finish the main structure. What was one of an innovation was a presence of columns in the Great Workroom. They are 23 cm in diameter at the bottom and 550 cm in diameter at the top. Every detail of this unusual estate in Wisconsin has been refined in a precise and almost maniacal manner, as Frank Lloyd Wright used to create. As a consequence, the building cost much more than the architect and the then company administrator, Herbert Johnson, agreed at the beginning. Initially, the estimated amount was 175,000 euros, but it was one million more. It was worth, however, to spend this exorbitant amount. The Wright project complex is visited every day by hundreds of tourists, primarily architecture students, who are still stunned and amazed by its precision and innovation.

The way of dividing space changed in 1980 where cubicle form was invented. It was a response to economical issue. It was possible to put a lot of workers in one room, because the only thing which was given to them was a desk. 1980 is also a beginning of computer age. It became more common to use in offices. With the coming years technological development was taking place. Computers were becoming more common as well as the Internet. 1995 saw an introduction of java.

2000 brought a new ideology to an office design: office flexibility. Employers realized that it is not necessary for employees to be all the time at office. Thanks to wireless technology it was possible to work almost from everywhere. Business also recognized that it is important to pay more attention to worker's well-being. The idea of modern office is to create a place both to work and to leisure. There is an evidence that creative workplace increase productivity of workers and as a consequence has an influence on economic growth of a company (NIEZABITOWSKA, 2011).

HISTORY OF OFFICE DESIGN



Office plan was like a stripe system to fit more desks, therefore more workers. This system allows managers to scrutinize employees easily.

Furniture: sturdy, wooden chairs and desks

1900

Typewriters appeared in an office and because of that it was necessary to use bigger desks. Workers usually sat opposite each other.

Furniture: more comfortable, swivel chairs

1930



1940

It is time of equal rights. Women started to work in an office.

It is time of open space plan. Health and well-being of employees became more important.

Furniture: chairs with more comfortable back support.

Because of the typewriters development it was necessary to design more space for paper storage.

1960



As well as in 60's and 70's offices were crowded



For the first time computers appear in an office.

1980

Cubicle design - an open space divided into individual enclosed workstations.

1990

One of the biggest development was popularization of internet access.



Creative office design resulted in various type of workstation.

2000

Office design took into account well-being of employee. Relaxing area and boardrooms were designed.

Advancements in technologies.



Figure 2. Graphic made by the author - history of office design

4.2 Examples of offices

Contemporary job creation philosophy is like a transaction in which each part gains: the employer invests in a reliable and holistically designed office, counting on the good financial results of the employees. At the same time employees are working in a friendly workplace, which is adapted to their needs, achieving better results and they strongly identifying with business.

Attractive design, perfect details, best materials and high quality performance are what can be called a complete office. There are some offices, which are characterized by finest design. In 2016 a Norwegian office situated in Poland (Wrocław) which was designed by Polish architecture studio won Finest Interior Award 2016 in category: the best office design. The Finest Interior Award is a competition organized by the prestigious German Heimtextil trade fair in cooperation with the German and Austrian associations of interior designers (Verband Deutscher Architekten VDA, Bund Deutscher Innenarchitekten BDIA, Bund österreichischer Innenarchitektur BÖIA). Architects and interior designers are rewarded for creativity in planning and implementing innovative solutions. In the following year 2017 the same project won the Best Office Awards which is a Russian Architecture Competition.

Designers of the studio mode: lina™ faced the task of designing interiors for the Norwegian department of Opera Software, the company which created popular browser. The headquarters are located in two prestigious tenement houses in the center of Wrocław - from the beginning of the 19th century. These buildings are very important for the city as well as for its residents. That is why the city's architecture and surrounding was an inspiration for making the project. Taking into account the stylistic preferences of the employees and the climate of the city, the final effect was maintained in an industrial, loft atmosphere. Thus, the image of Wrocław as the "city of one hundred bridges" has become the guiding theme. In the interiors dominate the structure of arches, trusses and colors referring directly to the most famous crossings. In the arrangement of kitchen annexes there are but there are recognizable references to architectural icons of the city such as the construction of the Market Hall, the characteristic hall of the Main Railway Station or the Szczytnicki Park. Conference rooms are associated directly with computers and the IT industry: integrated circuits, fans and decks were created by the use of almost a thousand of old disks and over two hundred keyboards. Office interior

is adopted to various activities and leisure. Young staff works in a non-corporate style whicg enhances their creativity and ensure well-being. Pictures below present a visualizations and inspiration for the project.



Figure 3. Opera Software, meeting room



Figure 4. Opera Software, kitchen



Figure 5. Opera Software, eating area



Figure 6. Opera Software, reception

Project's inspirations

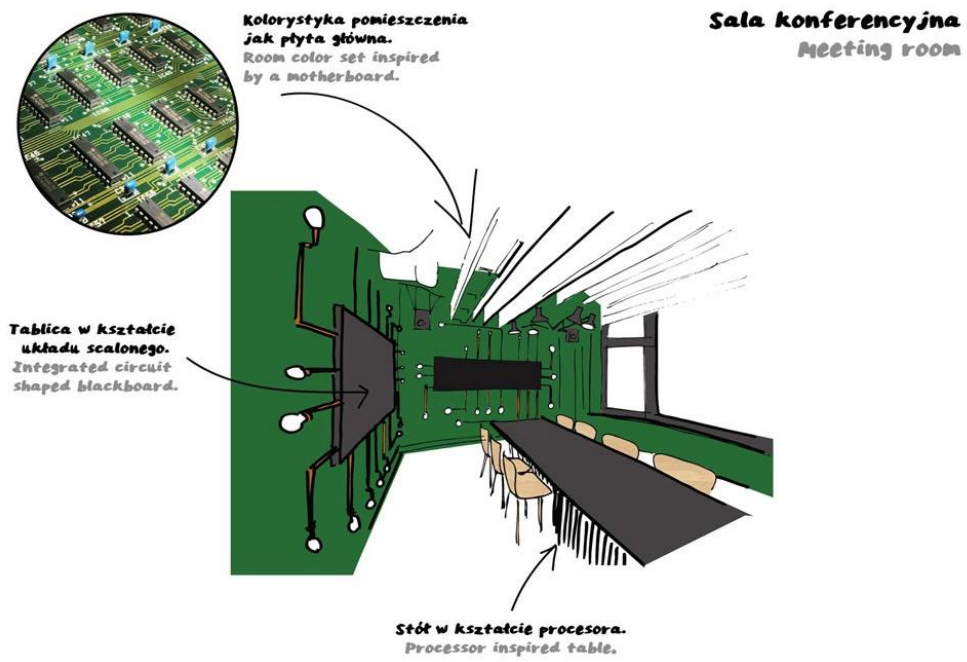


Figure 7. Meeting room inspiration

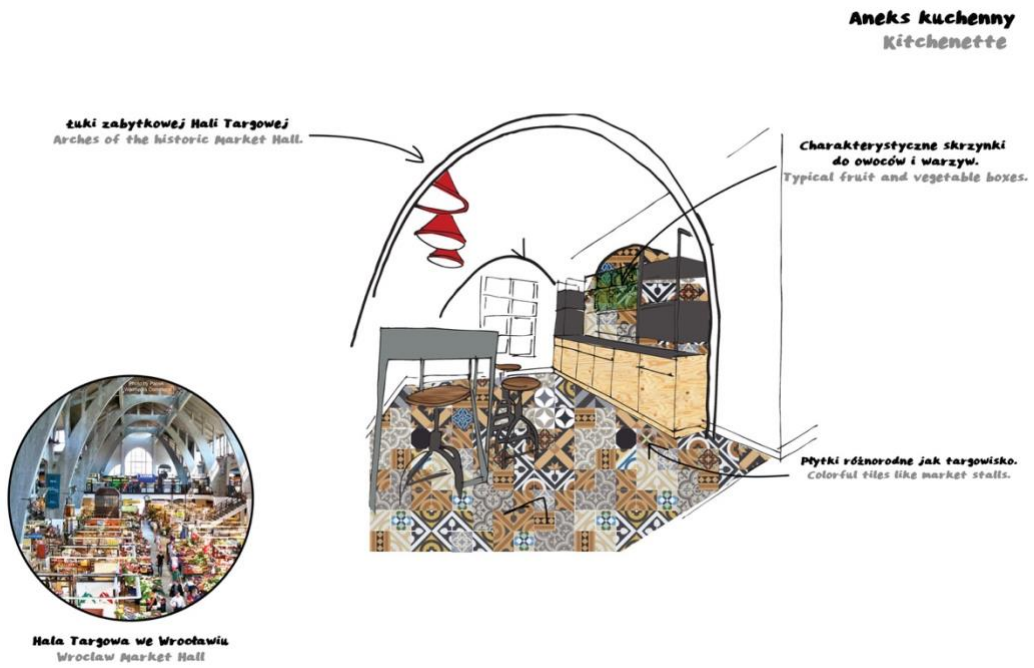


Figure 8. Kitchenette inspiration

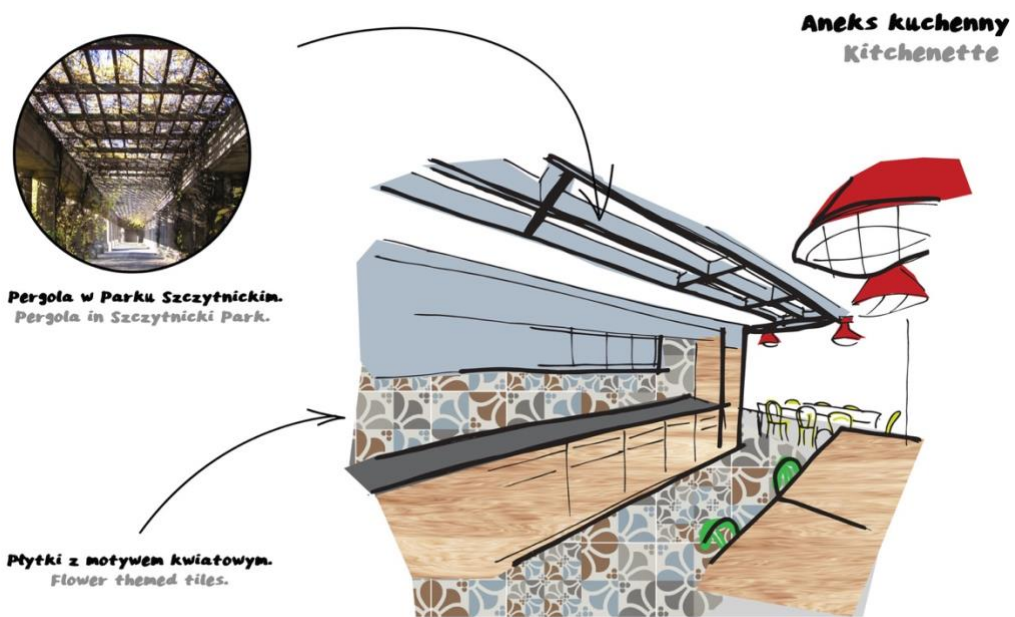


Figure 9. Kitchenette inspiration

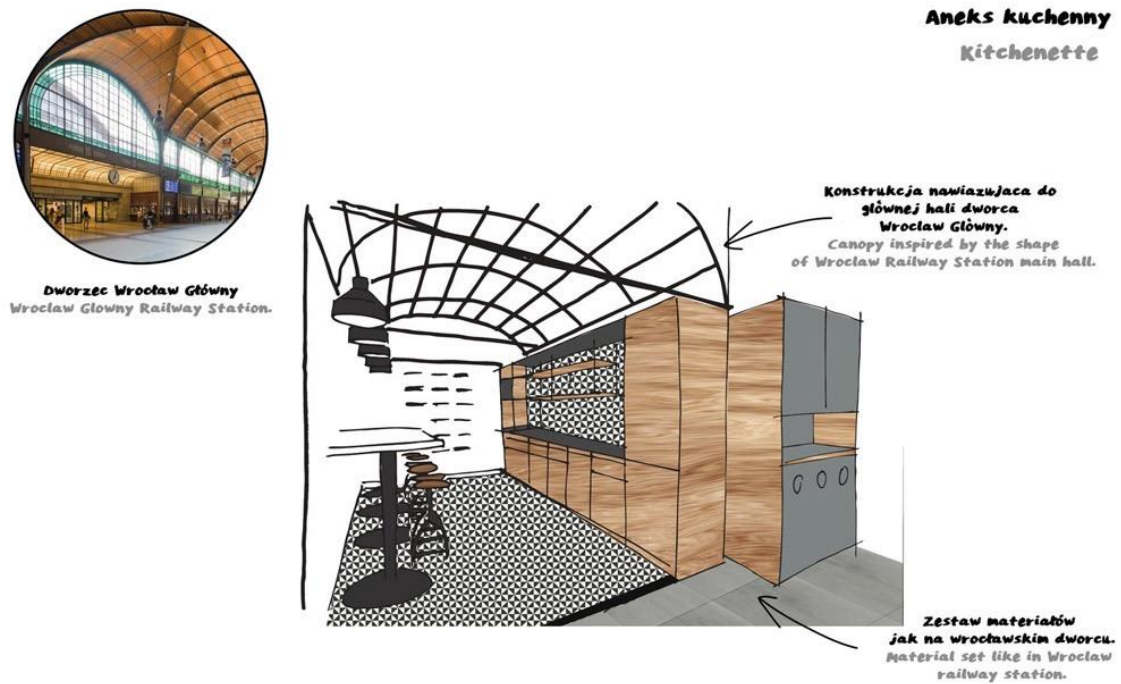


Figure 10. Kitchenette inspiration

Another interesting project of the office interior is the headquarters of Aviva. Aviva specializes in individual life insurance extended by additional health and accident insurance. A company hires one thousand three hundreds employees in different age and with varied needs. New office is designed on twenty thousands square meters in eight-storey building called Gdańsk Business Center in Warsaw. Aviva in a new office introduced a type of working called Activity Based Working, which is characterized by mobility and creativity, work in teams and in various locations, extensive use of digital tools.

Project was created by Polish architecture studio InDesign Zbigniew Kostrzewa. The office is not divided into single workstations assigned to specific employees. In that place there are separate zones designed to perform tasks of different dynamics - alone or in team. From the sets of desks for individual teams, through small desks for self-centered work, design tables and meeting rooms, up to the relaxation zones and social sections. All elements are ergonomic, comfortable, functional and aesthetic. There are no cabinets for presidents and managers. There is a zone which attracts attention and it is called by employees Beach Bar. It is area where workers can talk, have lunch or work. This part of the office has been designed in the style of a seafront cafe with direct access to the multifunctional terrace. On the partially covered terrace, there are places to work

and to rest as well as outdoor fitness section. There are also unusual rooms for the classic office - a library, a playroom equipped with table football and hockey, and rooms for careers with children. In total there are over 100 different rooms created for the efficient organization of work. The entire office space is designed to meet the needs of employees and thus support their creativity and collaboration. Nowadays human being is the most important subject taking into consideration in an office design. Company profit is a result of employee's work, that is why it is necessary to ensure the best possible condition of work (WALENDA, 2017).

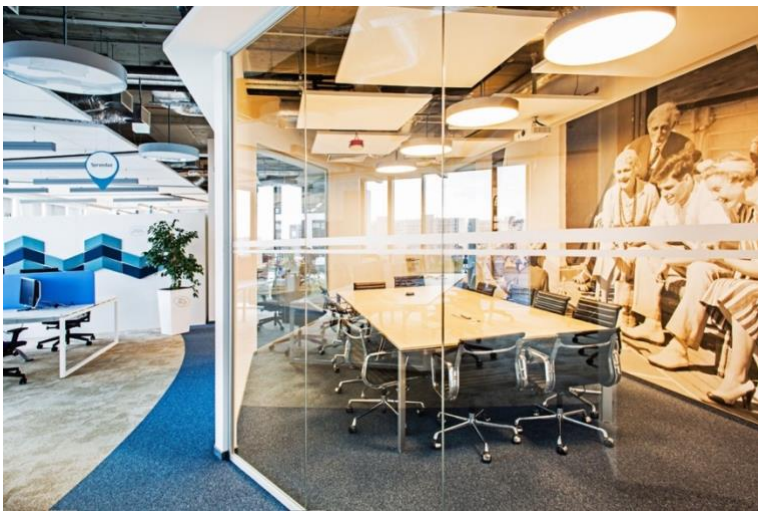


Figure 11. Aviva's office



Figure 12. Aviva's office



Figure 13. Aviva's office



Figure 14. Aviva's office

4.3 Principles of office design

To create an office with a purpose of stress reduction issues, there are many strategies and principles which could be applied. Starting from ergonomics furniture, appropriate colors, light and ending at relaxing zones and physical fitness centers (Hardy, 2016).

At the beginning it is essential to meet basic standards concerning ergonomics of space where employees can work optimally productive (Meel, 2010). Complying with ergonomics requirements all other stress reduction ideas can be introduced. Such elements as proper layout of the office, adequate lighting, silence and a nice view of the

window, affect the employee's productivity A proper layout is considered as a plan which is divided fictionally and perfectly fits to character of the company and to employees and employer's needs. The functional division of space naturally introduces the zones needed for the normal functioning of individual departments (MARTENS, 2010).

In Polish law, the office's lighting must comply with the provisions contained in the Ordinance of the Minister of Labor and Social Policy on general health and safety regulations and Polish Standards:

PN-EN 12665: 2008 Light and lighting - Basic terms and criteria for determining lighting requirements.

PN-EN 12464-1: 2011 Light and lighting - Workplace lighting. Part 1: Workplaces indoors (annexes pages 110-114).

According to these documents, it is necessary to ensure the required intensity in the field of visual work. Excessive differences in luminance in the proximal and distal surroundings of the work surface are unacceptable - eyes are detached from the object or work surface and transferred in different directions. Properly designed office lighting must also take into account energy aspects related to the maximum use of daylight and the selection of optimal installation equipment. It must be remembered that reducing the energy consumption of the lighting installation does not cause deterioration of the perceptual aspects (Standard PN-EN 12464-1, 2011).

Increasingly, in large companies, people work side by side in large, open spaces. On the one hand, employees have the opportunity to exchange information and build relationships, but on the other hand, the continuous information noise interferes with work. Such noise limits the productivity of employees, and thus has a negative impact on the company's results. The applicable limit values for noise at work stations due to its nuisance are defined by the Polish standard (PN-N-01307, 1994). According to this standard, the equivalent sound level A for administrative rooms, design offices, theoretical work, data processing and other similar purposes should not exceed 55 dB (annexes pages 114-115).

Designing a room to relax and gym in an office building, and then its equipment generates an additional cost. Nevertheless, many companies decide to include this type of expense in their budgets. Above all, the short break has a positive effect on concentration at work. After its completion, the employee sits down to the desk with a refreshed mind, he works not only more effectively, but what is particularly important in some industries - his creativity is growing significantly. This in turn contributes to the

implementation of better quality projects that are more valuable to the company and thus more competitive on the market (DANNENBERG, 2011).

Additionally, by introducing these elements it is possible to eliminate mistakes made at work by 15% (presence of plants) and to increase productivity up to 8% using proper light intensity (GATTERER, 2009).

Stress and productivity affects each other. It is impossible to separate these two subjects. Workers which have to deal with strong stress at work can not be productive. And if there are not productive they become to get stressed. That is why in this work design techniques are dedicated for both reducing stress and increases productivity.

4.3.1 Type of work space

The most important indicator of office design is a size of space and character of work which is done in that space. There are various types of workstations for both individual and multiple employees. Each of them has to take into consideration space suitable for desk-related activities such as reading, writing, telephoning and PC work. The basic minimum space which is recommended for workstation is around 6 m² (basic space for writing, reading etc. plus additional space for paper plus space for storage) (MARTENS, 2010).

Open office is lately one of the most popular type of space development. This workstation is intended for more than 10 people. It is suitable for collaborative working as well as for routine working which does not need much concentration. Open office is the best solution to create an easy communication between workers and to improve their interaction. It is an effective way of using space with ability to increase the number of people by adding an extra desk and chair. Unfortunately, the acoustic and visual privacy is limited. Even if sound-absorbing materials are used it can be loud in such an office. Definitely it is not suitable for activities which require concentration (WALENDA,2017).

Another space which is suitable for teamwork is a team space also called a cluster. It is intended for two to eight people who require frequent communication. Individual work can be also performed in this office but only if the level of concertation is medium or less. Desks can be arranged in different ways: face-to-face to increase interaction and back-to-back to enhance concertation. The main advantage is an efficient utilization of space. The same as in open space, team space promotes collaborative working

(MARTENS, 2010).

To achieve more privacy, it is necessary to separate workstation only for one person. Cubicle is a great example of semi-enclosed space dedicated to one person who does not require much concentration. For the first-time cubicle office was created by designer Robert Propst for Herman Miller. It was a response for economical space utilization and at the same time for improvement of worker's well-being.

Private office is an option for all who need a lot of concentration or if the character of work requires many meetings. It is an enclosed workstation for one person who easily can do all activities confidential. Usually it is a marker of employee's status. The main advantage of this type of space is its private character and possibility to adjust environment's condition to suit employee's need (ULRICH, 1991).

4.3.2 Colors

Johannes Itten (1974) in his book 'The art of color' explains in very poetic way the word 'color'. Color is referred to as a life, otherwise world without colors would seem to be dead. He compares colors to the 'childs whose mother is a light'. Human-beings are able to see the colors only thanks to light. Brusco (2012) explains that color is not just a color but a its projection depended on the light rays which that object is able to reflect and absorb. Human-being is able to distinguish up to 10 million colors, based on three basic ranges: red, yellow and blue. Conflation them creates colors palette (MCLEOD, 2016). Colors are interpreted not only in optical way but also in mental and symbolic aspect. Color is an energy and can affect people positively or negatively no matter if people are conscious of it (ITTEN, 1974).

For years, scientists have been studying the color topic in office space. The influence of colors on human psychology is confirmed by the latest research as well as ancient philosophies dating back over 3,000 years. It is significant which color surrounds people, because each of them has different properties (Hatfield, Allred,2012).

Correctly composed office colors can have a positive impact on the productivity of people and vice versa, poor color combination of the room causes fatigue, irritability and drowsiness. Choosing the color of the interior of the office should depend mostly on the character of work which is done and on the personality of the people working there (ELLIOT, 2015).

There are three primary colors blue, yellow and red, and three which after mixing

them together create black color. There are also three secondary colors, orange, green and violet. They are observed while two of primary colors are mixed (MCLEOD, 2016). In psychological aspect there are four primary colors: blue, yellow, green and red. Each of them affects different emotions and behaviors. Red affects the body, it is good for spaces where people work at night or with a lot of physical activity. Adding as a accent it is a perfect color for negotiation. By contrast blue affects the mind, calms people and promotes communications and efficiency. It is recommended for brainstorming rooms and detail-oriented spaces. Yellow has an influence on self-confidence, stimulate creativity and optimism. However too much yellow color in office can lead to anxiety and increase people's anger. Green affects the balance between mind, body and emotions. It boosts creativity and inspires innovations. What is more green reduces anxiety and eye strain. It is a proper color for innovative and brainstorming space as well as in area where computers are used. Orange and white both creates creativity furthermore white creates a sense of spaciousness (Wright, 1999).

On the other hand colors like gray, beige, white in the office can cause feelings of sadness, gloom especially in women. It was noticed that purple and orange elicit the same feelings of depression in group of men. Achromatic colors like white and black are neither stimulating nor productive. Moreover, such coloring increases the risk of professional burnout by 25% (MCLEOD, 2016).

There are some researches which give information about Pole's preferences for colors in office decor. This project is called Colorful Poland and it is carried out by the Dekoral Fashion brand. The dominant colour in Polish offices (nearly 25% of the workforce tends) is shades of green and blue (tweed green, lime taffeta, azure blue). Studies indicate the dependence of color preferences on occupations:

- denim blue are selected by health and beauty professionals, research and development department, construction and IT,
- azure blue is the color of the office preferred by the administration, education and training, the hospitality industry and media, culture and art workers,
- lemon colour- one of the most popular colors in the office is the choice of finance staff.

Proper color selection for the office interior also has an impact on work comfort. A defined range of colors can stimulate and motivate employees. The office arranged in accordance with the nature of the industry or the style of the company also positively influences the efficiency of work.

It is possible to list some colors and their impact on human's mood:

- blue and white are the colours which have significant role in employee's motivation
- blue, purple, yellow, grey and white have impact on worker's productivity
- yellow, purple and white inspire workers
- green, blue and white have an impact on the happiness of employees
- yellow, blue, green and white affect worker's creativity
- orange, green, blue and white have an effect on worker's enthusiasm
- gray can cause feeling of stress

Color, shade can affect job performance, mood, productivity, creativity and willingness to work. Although the way of perception of colors is often individual case, when it comes to the general principles and influence of colors on psyche, all people react similarly. The influence of colors goes deeper than people consciousness invokes our primordial instincts and these are in turn embedded in human nature (WRIGHT, 1999).

By using colors it is possible to model the room. Intensive colors make the object visually closer, while the bright and cool make the distance. Therefore, in small rooms it is better to use pastels and lighter shades, while large space can be painted with dark and intense colors (ITTEN, 1974).

However, the choice of color in interior design should be the compatibility with colors used in the brand of the whole company. It is important to ensure that colorful interiors do not conflict with the overall image of the company. Colors tailored for example to the company logo or promotional materials can enhance the image of the company on the market. The well-structured coloring of the company, starting with the logotype by optimally emphasizing it in the interiors of the office space can influence the recognition and even increase the prestige of the company.

4.3.3 Office furniture

Office space in the past decade has undergone radical changes. Everything by the prevalence of the Internet and changing the form of document storage. By aside from the traditional small, family companies, the entire office world has turned paper invoices into electronic documents. The level of formalities has decreased, the precious time has been increased as well as the possibility of using it in a completely different way (GATTERER, 2009). In every company, each workstation is equipped with computer with connection to the global Internet. Office furniture, along with the development of electronic

documents, digitization and global globalization, have begun to lose some value. Many of corporate offices outsource some services such as accounting to external company. This fact makes the office look quite different from that which existed a dozen years ago. First of all, every modern workstation consists of three components that can be assimilated to the office furniture: desks, swivel chairs and possibly a small container with drawers on wheels (DOORLEY, 2012).

At the turn of the last ten years, it can be seen a change in an approach to furniture design. The materials, shapes and functions of furniture change. The trend of eco-inspired offices has been trendy for two decades. Recycling is more and more popular and plants in office are a common view. The design of modern offices aim to move away from permanent solutions such as the arrangement of space with partition walls or cubicle workstation. Instead, mobile solutions are presented that not only have different functions depending on current needs, but also can be easily reshaped in space (JACOBSON-KOENEMANN, 2016). Year 2017 will also be the beginning of the golden era of modular furniture that is easy to adapt to new and changing requirements. Modular furniture allows for any arrangement depending on the function and size of the interior. There are more and more this type of furniture on the market that can be used for the office interior - soft chairs, sofas, tables, desks or pouf. Some of them are equipped with upholstered blends that allow to separate private areas and to introduce silence into workplace (BARTLETT, 2017).

Still, the minimalist trend continues to be. Simple and clean lines, materials such a wood, glass, solid concrete and metal are used. Metal has so far been associated with outdoor furniture, which by nature must be more durable and weather resistant. Metal constructions or elements have been applied and highlighted in many projects in sofas, armchairs, chairs and interior accessories, in the office context. This makes furniture not only more durable, but also more resistant and visually lighter.

One of the new elements that is increasingly visible on the office market in Poland is the wave of renovation of office buildings came into existence several years ago. All objects are being modernized, but also individual offices of large tenants. Changes in buildings are the result of following modern solutions, but also the need to adapt the objects to the current requirements in the field of sustainable construction. Each new arrangement of office space is now subordinated to two trends: design and ecological solutions matter (NIEZGODA, 2013). The Polish Association of Ecological Building (PLGBC) is working on the Database of “green materials” – materials which are

ecofriendly recycled and as little processed as possible. In addition to unrivaled wood, on the list would be silicates available on the market and white (sand) cellular concrete. It seems particularly important to be able to use waste materials in construction by reusing useful structural elements (reusing) or using raw materials as ingredients for the production of new building components recycling (LATOSIŃSKA, 2007). Ecology is always a good solution in any interiors.

Differences between work spaces and relaxation zone disappear (POCHEPAN, 2017). More and more employees work at homes, in cafes or in coworking spaces. In offices they allow themselves to spend more time for relaxation in specially designed areas. This new trend makes that hard division between office, home and public furniture fade out. The modern office places require a lot from furniture manufacturers - furniture suppose to be smart, mobile, esthetic, well-designed and they should simplify work. At the same time they should give a possibility for relaxation (MARTENS, 2010).

In 2017 and beyond, air quality, natural light that does not tire the eyes, proper temperature, good acoustics and ergonomics will be the most important Dr Craig Knight² listed. According to experts, among others Elizabeth Grace Saunders (2015) these five aspects can increase employee satisfaction by as much as 30% and consequently reduce absenteeism at work. Equally important is providing employees with intimate spaces where you can talk over the phone, meet in an intimate space and discuss an important project or in the silence and calm to prepare a presentation. In the midst of noisy open space offices and the hustle and bustle of shopping malls, silence has become a luxury product. It is also a problem of contemporary flats and cafes and restaurants, because acoustics has not been considered for interior design for years. At the same time, modern consumers need quiet zones, which is a reaction to the overwhelming information and incentives that attack from all sides. Because of the need of silence modern offices are equipped with silence zoon and more acoustic and collaborative furniture (POCHEPAN, 2017).

Offices should not only ensure convenient storage of all the necessary items and documents, but also create the right atmosphere for work. The ergonomic office chairs,

² Dr Craig Knight is a psychologist specialising in Psychology of Working Environments with especial regard to well-being, creativity and productivity. The research conducted by him involved more than 2,000 office workers in a series of studies looking at attitudes to — and productivity within — working space.

which are adjustable for height and tilting, provide great freedom of movement. In the case of employees whose job is creative, artistic, it is worth thinking about adjustable desks. The ability to change positions significantly improves ergonomics. In addition, lifting the desktop makes it possible to separate two functions of workstations zone for individual working and for standing meeting and designing work.

The latest report commissioned by the British Council of Offices (2017) shows trends in the expectations of office workers from their workplace. As many as 80% of the respondents consider the cleanliness of the office to be important factors affecting their work comfort. Approximately 70% of employees value a quiet place to work. Almost 60% of the respondents point out the arrangement of the office, and almost half value the presence of common space, where you can work in a group and exchange ideas. Other important factors mentioned by the surveyed persons include: access to green areas, ecological aspects of the functioning of the office and the ability to work in various places within the building.

A list below present seven trends which are popular in office design nowadays (POCHEPAN, 2017).

1. NATURE

Nature inspires not only in the aspects of cosmetics, food or clothing, people increasingly want to surround themselves with natural beauties, so leather or wood products are definitely dominant in the office design.

2. WHITE

White is a perfect background for other colors, complementing and enhancing the office space. White elements bring in freshness and bring to life the darker areas.

3. CONTRAST

White needs a contrast, and in this role perfect juicy, strong colors: green, red, orange and black. They are best painted high gloss with aluminum, wooden or leather finishes.

4. ERGONOMICS

Users are increasingly aware of the ergonomics of office furniture, for example, the use of electrical height adjustment desks and location memory to easily adapt to specific users.

5. MOBILITY

The possibilities of sliding containers, desks, armchairs and even partition walls allow for easy reorganization of office space and adapting them to current needs such as conferences, meetings, group work.

6. COMMUNICATION

The most important thing in the company is communication. Compounded work desks need to be grouped together to allow for communication between employees while ensuring comfort. It is also important to be able to conveniently connect to the IT network through media outlets located in conference tables and desks.

The image of the company in the eyes of customers, employees and the atmosphere of work determine the success of the company. The decor of the office is not indifferent - it must provide comfort for the employees and the customer entering the office is expected to feel good and professional. The office should fulfill two functions: representative and functional (NIEZGODA, 2013).

5. PROJECT

5.1 Kolanko company

Kolanko company was established in 1992 in Chwaszczyno in Poland. Initially, the company's offer included retail and wholesale of water and sewage materials, sanitary and heating products. From 2016 company extended the offer to interior materials. Because the range of products were diversified a new office, showroom and shop was necessary. For this purpose a building with a surface 1680 m² was designed.

Building contains:

- showroom of sanitary technology, fences and paving stones
- hall selling sanitary and interior materials
- cafe
- warehouse
- office part with a separate recreation area for employees
- technical rooms

The logo for Kolanko is displayed in a bold, red, sans-serif font. The letters are thick and blocky, with a slight shadow effect. The 'K' and 'C' at the beginning and end of the word have a unique, rounded design.

Figure 18. Company's logo

5.2 Localization

The building land is located in Chwaszczyno in the junction of road number 20 and 218. On the west side, it is adjacent to the Toyota car showroom, from the east to the communal road. On the north side of the plot is adjacent single-family residential buildings, south of the area is not occupied. The surface of the plot is 6013 m².



Figure 15. Company's localization in Poland.

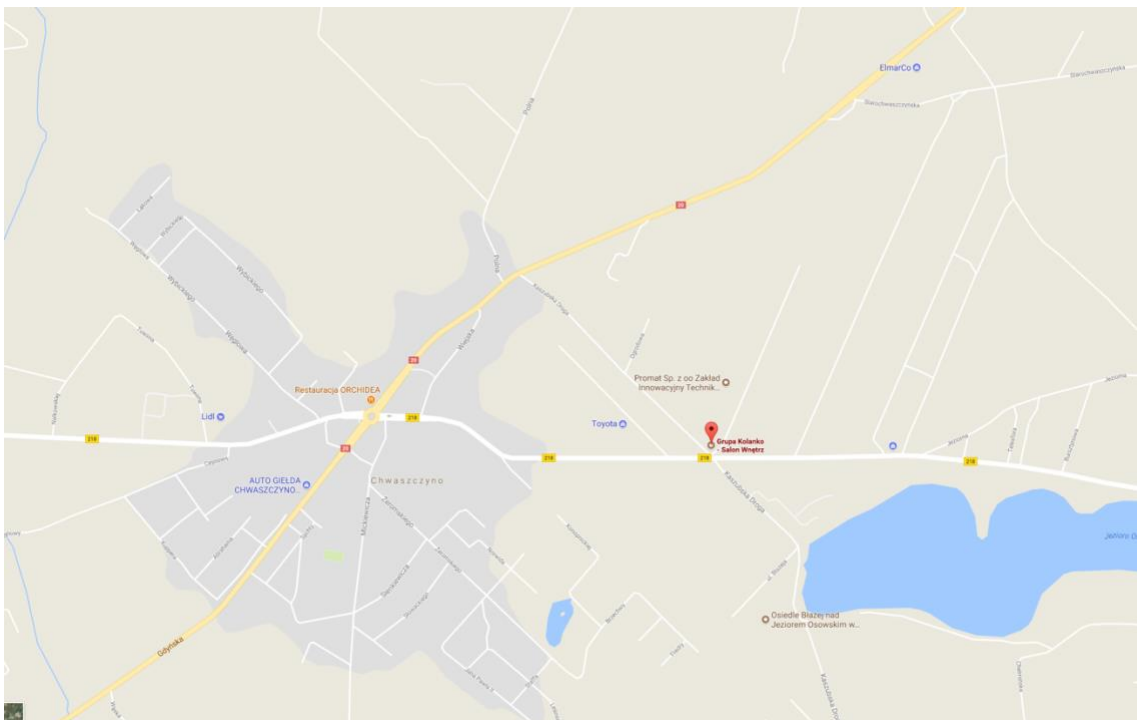


Figure 16. Company's localization in Chwaszczyno.

5. 3 Characteristic of employees

Kolanko company hires 115 workers. In the new building there will be twenty-five people working in different department. Interior design team is composed of eight

people: manager and deputy manager, interior architect and five technical advisor. There is one receptionist and one human resources and pay specialist. Eight employees work in storehouse: Warehouse Supervisor and seven Warehouse Worker. Two people are responsible for computers and data networks: Chief Information Officer and IT Engineer. There is also a Sale Department with Sales Manager, Sales Representative, and Complaints Department Employee. A President and Vice-President will work at new building too.

5.4. Building description

The designed building is composed of two basic solids. The front part is covered with a flat roof, large part is made of glass and it has a representative character. The front is connected with the rear part which is covered by a sloping roof. The front part contains a showroom open to the height of two-storeys, a café area and reception. A storage warehouse is located at the rear of the designed object. In that part there is also a retail shop. All private offices are situated on the second floor. A President and Vice-President's office occupies the largest area and they have balcony.



Figure 17. New building visualization

ELEVATIONS

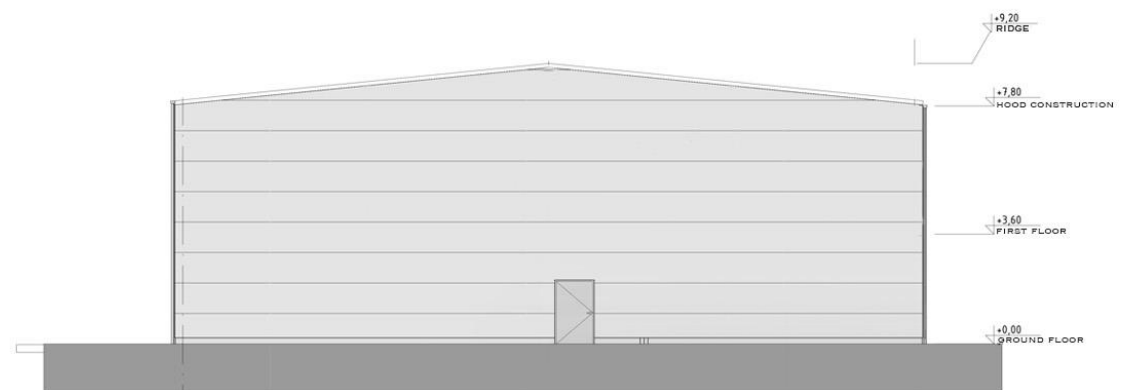
1 EASTERN ELEVATION



2 SOUTHERN ELEVATION



3 NORTH ELEVATION



5.5 Methods of investigations - survey

A survey was conducted to collect the data of employee's satisfaction with present interior design at office. One hundred people working in the Kolanko company were asked about conditions prevailing in the present office. 65 % responders were female 45% was male. In the first part the instrument questioned expressed their opinion about office design using a five-grade scale. Number 1 means they are unhappy and the condition are poor and 5 that they are very satisfied with condition and that no changes are necessary to do in that area. The second part was focused on employee's priority regarding office design elements. Using a ten-point scale, they ranked the elements that are most important to them (number 1) to those less important (number 10). The surveys were distributed personally to workers of Kolanko company. The

purpose of the survey was to get an employee assessment of the office, to know their preferences and needs. Their opinion is essential to create a new space, that assumes increasing productivity and reducing stress of employees. Most of employees are unsatisfied with conditions prevailing in the office, especially with noise, lack of light and office furniture. Everyone agreed that collaboration is essential to work better and to be more productive. However, the majority indicated that private offices are also needed. In the case when their work will require concentration, they can choose a private office where they can focus on work. Depending on the work performed in a particular day, employees said that they would like to have a choice and decide for themselves how and where they will work. The choice means that employees will not be so exposed to stress.

In the second survey, the vast majority replicated the same scheme to choose light, ergonomic furniture and cooperation as the most important elements. With these answers, it is possible to carry out the project in accordance with the expectations of employees where most of the rooms will foster cooperation.

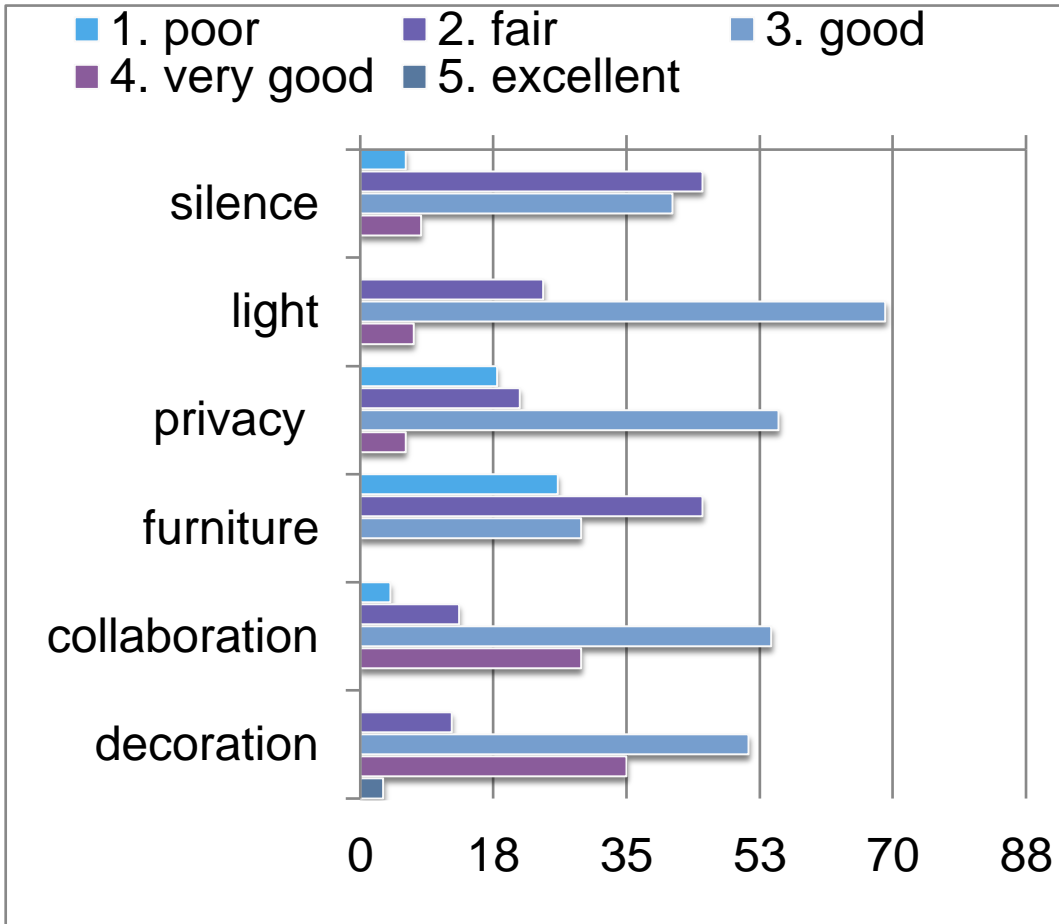


Diagram 4. Employee's survey answers

Employer's expectations in relation to the appearance of the office are not less important. The president, as well as employees, stressed that the cooperation, co-working is very important. He wants to improve the flow of information in the company but also improve the relations between employees. The president said that the the main goal of the new headquarter is to provide the best conditions for employees, because they are the card for the company. He believes that happy employees are inserts to provide much better customer service, what have influence on company image. The boss stressed that employees are a significant element of the company's success. In addition to employee satisfaction, it is important for the owner that the project uses new technologies and selected interior decorations. Design of furniture and elements is as much important as an ergonomincs in new office.

During the area observation it was noticed that there is no common area, where employees could meet each other, talk and rest. The kitchen is not big enough for all workers to eat there and to spend their break there. It is necessary to create a space adapted to a number of hired employees. Workers asked about such an area expressed their approval. They unanimously stated that such space may have a positive influence on their work.

Summarizing the main assumption of the project is to create a representative space that is a showcase of a company where both customers and employees will feel good. As workers said the cooperation is very important that is why the layout will be based on co-working with shared workplace. Taking into account the expectations of the owner, great attention will be paid to the decoration and interior finishing. The interiors will also be equipped with materials that are in the assortment of the company so that the whole office becomes a kind of showroom. Elements such as light and ergonomic furniture are the basis for building an office where employees work productively. Introducing a coffeehouse and play and relaxation room could have influence on reducing stress at work.

5.6 Project description

The project includes rooms located in a two-storey building, the new headquarters of the Kolanko company. Designed rooms have been selected by the criterion of their impact on the employee's productivity and beneficial effect on the well-being and stress levels. Taking these factors into account a showroom, a coffee area, a bathroom with sauna, a gym, a creative room, a conference room, a meeting room, a kitchen, a boss office, a private office, a team work office were design.

FUNCTIONAL LAYOUT - GROUND



KEY

● SHOP

● BATHROOM

● HALL/MAGAZINE

● GASTRONOMY

● SHOWROOM

● COFFE AREA

● RETAIL MENAGER'S OFFICE

● COATROOM















● BOILER HOUSE

● STOCKMAN'S OFFICE

FUNCTIONAL LAYOUT - FIRST FLOOR



KEY

	EMPTY AREA		GYM		PRIVATE ROOM
	BATHROOM		KITCHEN		SMALL MEETING ROOM
	MEETING ROOM		RECEPTION		VICEPRESIDENT'S OFFICE
	SALES DEPARTMENT		INTERIOR DESIGN TEAM		PRESIDENT OFFICE
	ACCOUNTANT'S OFFICE		CREATIVE ROOM		

Showroom is an inspirational space that allows customers to try out some ready-made solutions, which gives possibility to see various combinations of materials, products and types of finishes in reality. The interior of the showroom is dominated by architectural concrete³ and a red color (with reference to the company's logo). In the middle of the exhibition room there is a reception also made with architectural concrete. It is a place dedicated to two employees, a receptionist and a specialist from interior design team. Around the reception desk there are exposition constructions of sanitary tapware, lamps, paints, interior plasters and other products offered by Kolanko company. All products are placed on the red exposition stall.

The café is directly adjacent to the showroom and it is separated from retail shop by a green wall. The green wall is a kind of vertical garden, placed on a special module structure, equipped with an automatic irrigation and fertigation system and a lighting system. Each module of the PIXEL GARDEN system consists of a box in which there are two removable flower pots - this solution makes that composition of greenery arbitrarily changed. What is more, this type of green wall is easy to maintain. Kinds of plants that have been selected for the vertical wall project are easy to grow and they are characterized by the same soil requirements and low light demand (*Chlorophytum comosum*, *Fittonia verschaffeltii*, *Juniperus horizontalis*, *Peperomia obtusifolia*, *Philodendrum minimum*, *Plectranthus verticillatus*, *Nephrolepis cordifolia*, *Pellaea rotundifolia*, *Dracena deremensis*, *Plectranthus australis*, *Duranta erecta golden*). On the surface of 1 m² there are 18 modules with a pot diameter of 14 cm. Due to the installation of green wall, the soothing effects of nature can be easily and efficiently introduced into the building, allowing a symbiosis between architecture and nature. Café is an open space equipped with six tables intended for both employees and customers. The same as the whole interior, the café is maintained in an industrial style with lamps (figure 18, 19) and chairs made of wire elements (figure 20). The lamp is in the form of a wire cage and it has the shape of a geometric solid. The red color appears as an accent in the interior.

³ Architectural concrete from TopKolor company - decorative coating made of hydrated lime, marble flour and quartz sands. This plaster is a product that can be colored in the mass, which allows to reproduce the effect of architectural concrete. It has excellent resistance to harmful weather conditions and the effects of UV radiation and mold.



Figure 18. Hanging lamp Ø30x38 cm ADINE produced by LIGHT & LIVING

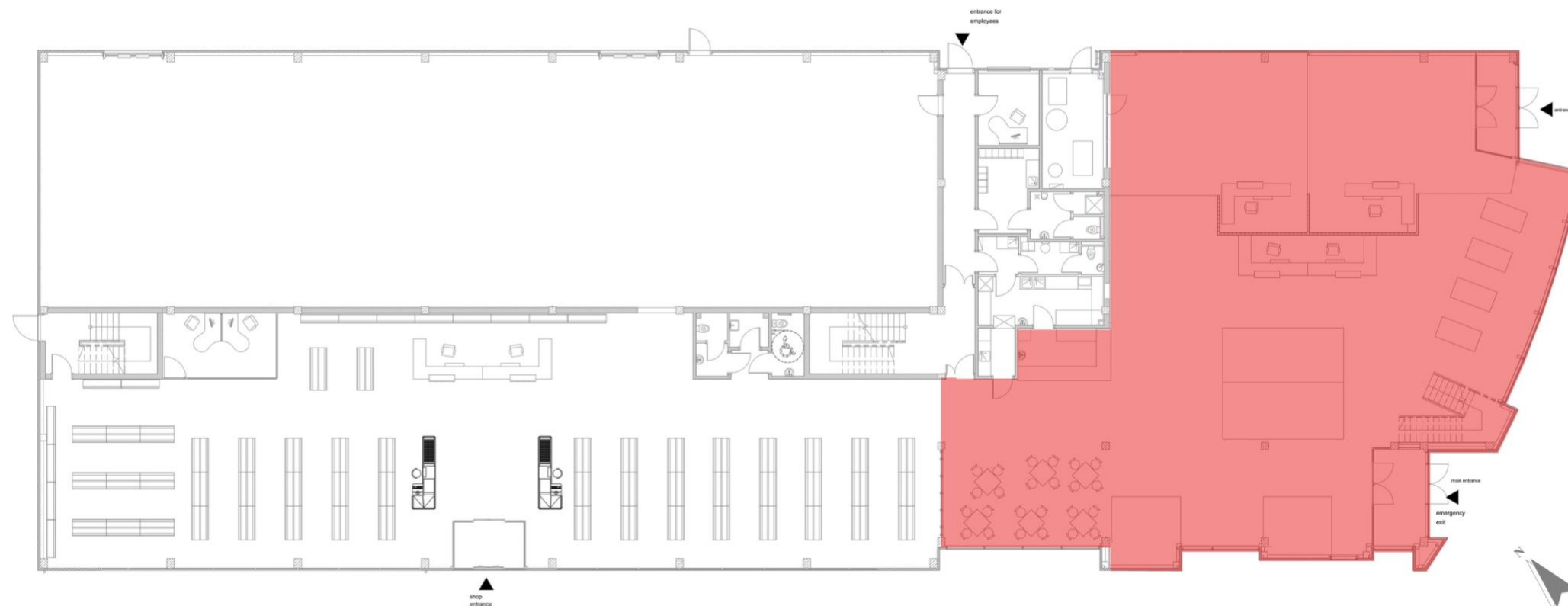


Figure 19. Carlton lamp produced by EGLO Lights International

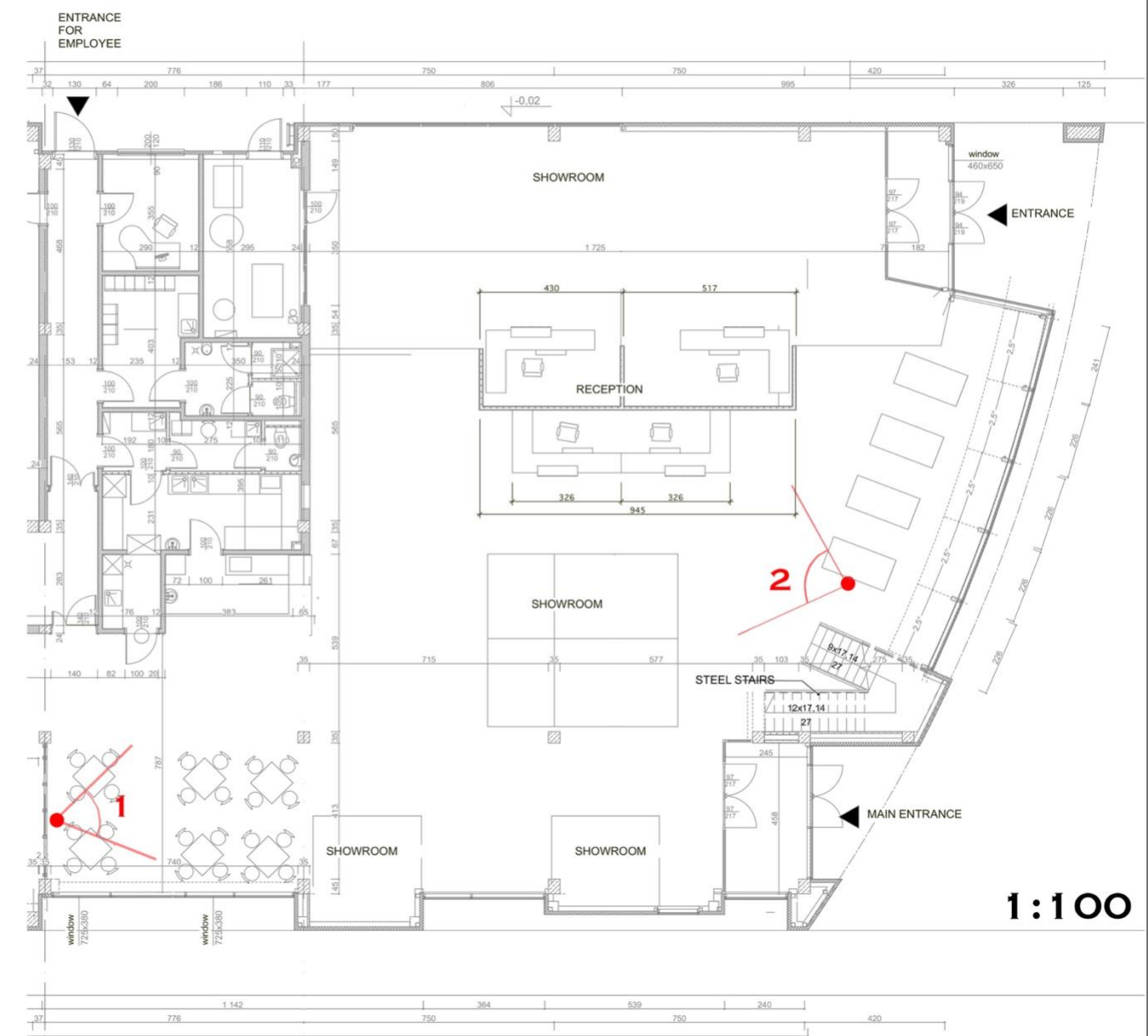


Figure 20. Metal chair produced by HK Living- WIRE MARSALA

SHOWROOM & CAFE



1:50



1:100

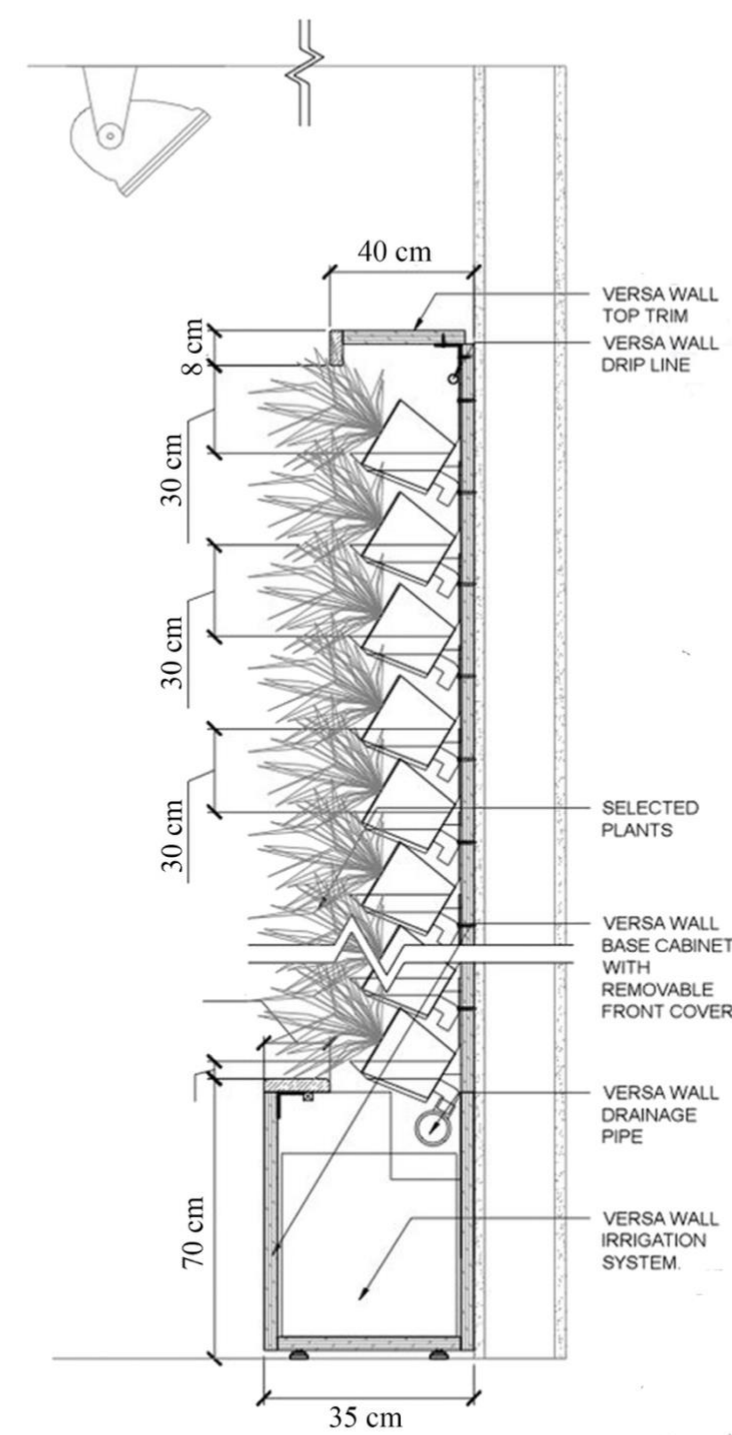
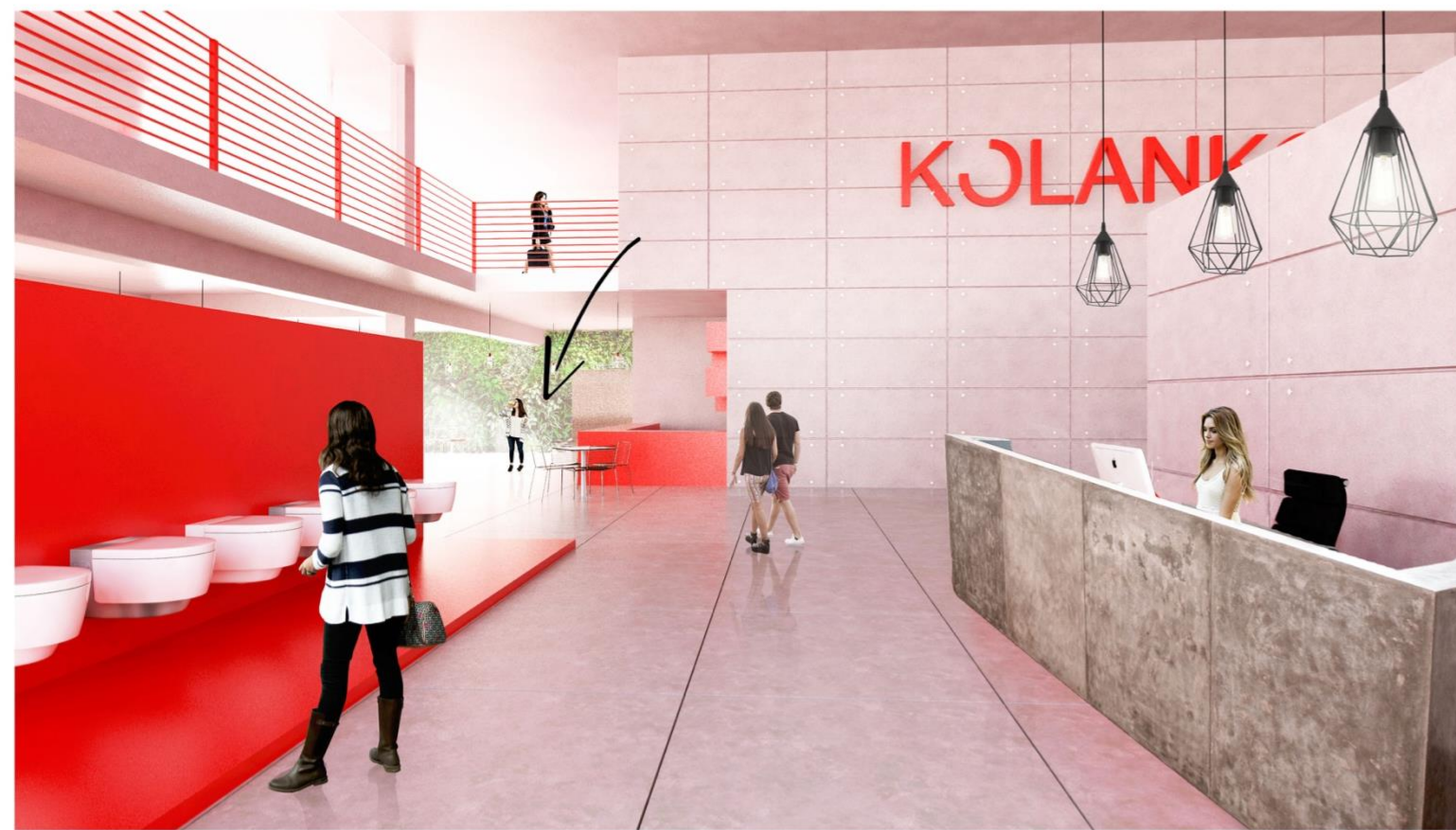
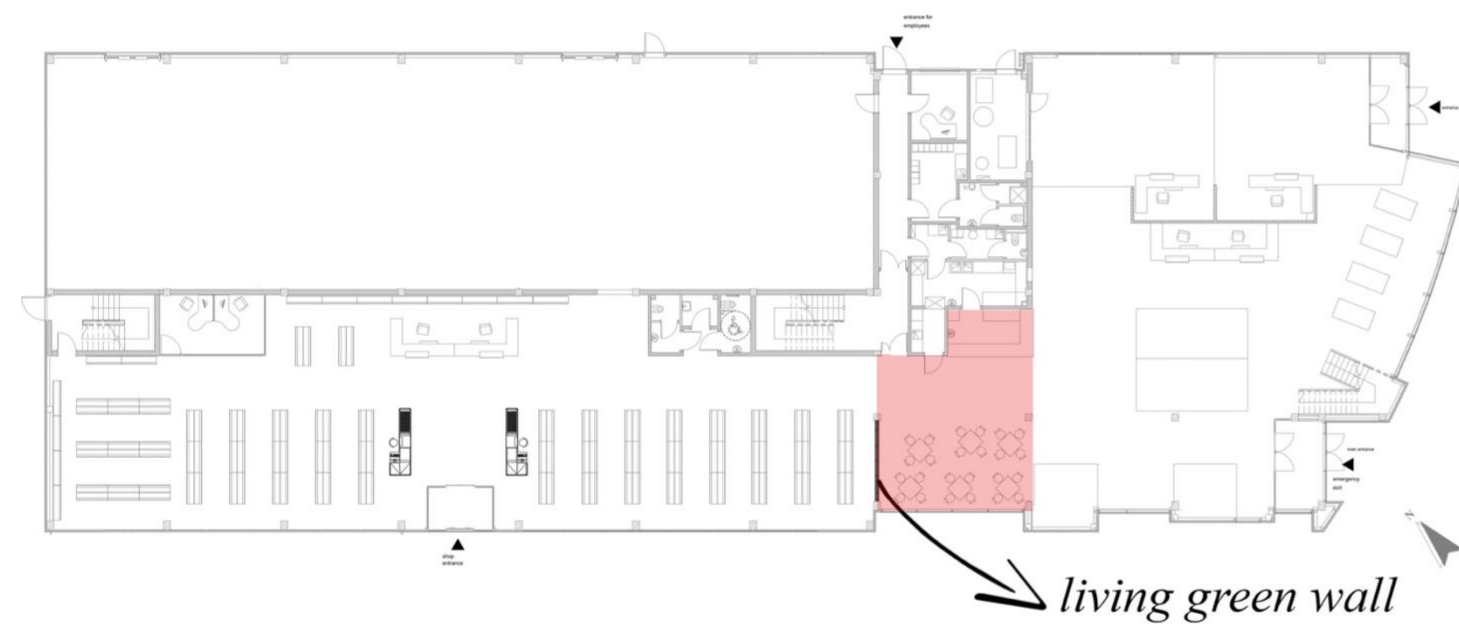


1 VISUALIZATION OF CAFE AND SHOWROOM



2 VISUALIZATION OF SHOWROOM WITH RECEPTION

LIVING GREEN WALL



GREEN WALL SYSTEM

GREEN WALL VISUALIZATION

SELECTED PLANTS



CLOROPHITO
Chlorophytum comosum
BOLSA DE 1 LT



FITONIA ROJA
Fittonia verschaffeltii
MACETA 6"



JUNIPERO
Juniperus horizontalis
MACETA 6"



PEPEROMIA
Peperomia obtusifolia
BOLSA DE 1 LT



PEPEROMIA VARIEGADA
Peperomia variegata
BOLSA DE 1 LT



PHILODENDRON MINIMUM
Philodendron minimum
BOLSA DE 1 LT



HIEDRA SUECA
Plectranthus verticillatus
12" / 3



HELECHO PEINE
Nephrolepis cordifolia
MACETA 6"



HELECHO ROTUNDIFOLIA
Pellaea rotundifolia
MACETA 6"



DRACENA LEMON
Dracaena deremensis
MACETA 6"



MILLONARIA
Plectranthus australis
MACETA 6"



DURANTA GOLDEN
Duranta erecta golden
MACETA 6"

Labbs (2000) found that common areas have influence on employee's productivity. Chats stimulates creativity no matter if it takes place in a corridor between offices, in a meeting room or in a dining room. In every company there should be a place where an employee can forget about work for a while, regenerate, clear the mind, because the best solutions and ideas come to mind when people relax, rest and do nothing. According to the research carried out by Draugiem Group in 2014, to perform duties effectively for a long time, employee must make a short break during work. The highest productivity is achieved by working 52 minutes without interruption, and then spending 17 minutes for relaxation. Almost 80% of ideas are created outside the desk, as a result of interaction with colleagues, which is confirmed by research conducted by Harvard Business Review, according to which accidental meetings at the company's premises improve business efficiency.

Creative room was designed to provide employees with optimal working conditions but also to create a place that will encourage an integration and relaxation. This room occupies a large part of the office and is designed in the shape of letter L. This shape allows to design two separate rooms of different character. In one area it is possible to brainstorm in one area but also to organize an informal meeting. In the second part employees can play billard, play games or watch TV. The space dedicated for playing games is separated from the rest by an openwork construction with pots. Due to the fact that the room is equipped with windows it is possible to introduce a various kinds of plants.

A Boston Fern and an Umbrella Plant were chosen as a decoration of a wooden structure. Sansevieria Trifasciata is placed in a big concrete pot and it is additionally illuminated by two ceiling lamps. All selected species are easy to grow and do not require a special care. Above and beyond a Sasevieria Trifasciata has the ability to converts CO^2 into O^2 at night and eliminate toxins. A Boston Fern is the most efficient plant at removing formaldehyde from the air while Umbrella Plant has an ability to absorb chemical impurities from the air. Due to plant introduction a room becomes more cozy with better air quality. The presence of plants also affects the well-being of employees and it increases a level of relaxation.

Architectural concrete is the main material that is found on the walls in the creative room. To revive the room with gray walls, the color was introduced into the interior. Yellow lamps (figure 21), pendant lamp with transparent glass balls (figure 22), chairs, pouf seat in different shades of red, and a blue sofa (figure 23). All three colours

are vibrant, affect productivity and promote communication. What is more, yellow stimulates creativity and optimism while blue calms down. Thanks to the gray walls and a few color accents, the room is balanced in terms of colors. At the same time it stimulates and allows to relax and keep calm.

Another material that is in the creative room is linoleum⁴ on the floor. Its biggest advantage is resistance to dents and abrasion. It is also easy to clean, it is warm and elastic. It is difficult to slip on it even when it is wet. Linoleum also has anti-bacterial and bacteriostatic properties - microorganisms do not grow on its surface, what makes it belong to hygienic floors. The wide range of colors allowed to choose the perfect shade of gray, darker than the walls.

In the creative zone, workers can find a variety of spaces customized to their needs: meeting and brainstorming space with comfortable chairs (figure 24), armchairs (figure 25), barstool (figure 26) and tables, a cozy pouf seats, cushions and even swing chairs. There are also three armchairs equipped with special acoustic isolation dedicated to those who want to rest in silence.

Undoubtedly, it can be said the more employees, the more ideas for spending free time. This room gives a lot of choices for employees. Everyone is able to find a perfect match zone depending on his or her needs at the moment.



Figure 21. Pendant lamp Susana available in online shop:
<https://www.lampy.pl/Przezroczysta-lampa-wiszaca-Susanna.html>

⁴ Linoleum – The carrier layer is made of burlap submerged in a flexible mass (mixture of oils), plant meals, resins and dyes. The outer layer is protected with wax. The durability of modern linoleum is calculated at 20-30 years.



Figure 22. Pendant lamp with transparent balls available in LEROY MERLIN



Figure 23. Scandi sofa available in Polish store AGATA MEBLE



Figure 24. Batilda chair, designed by ACTONA

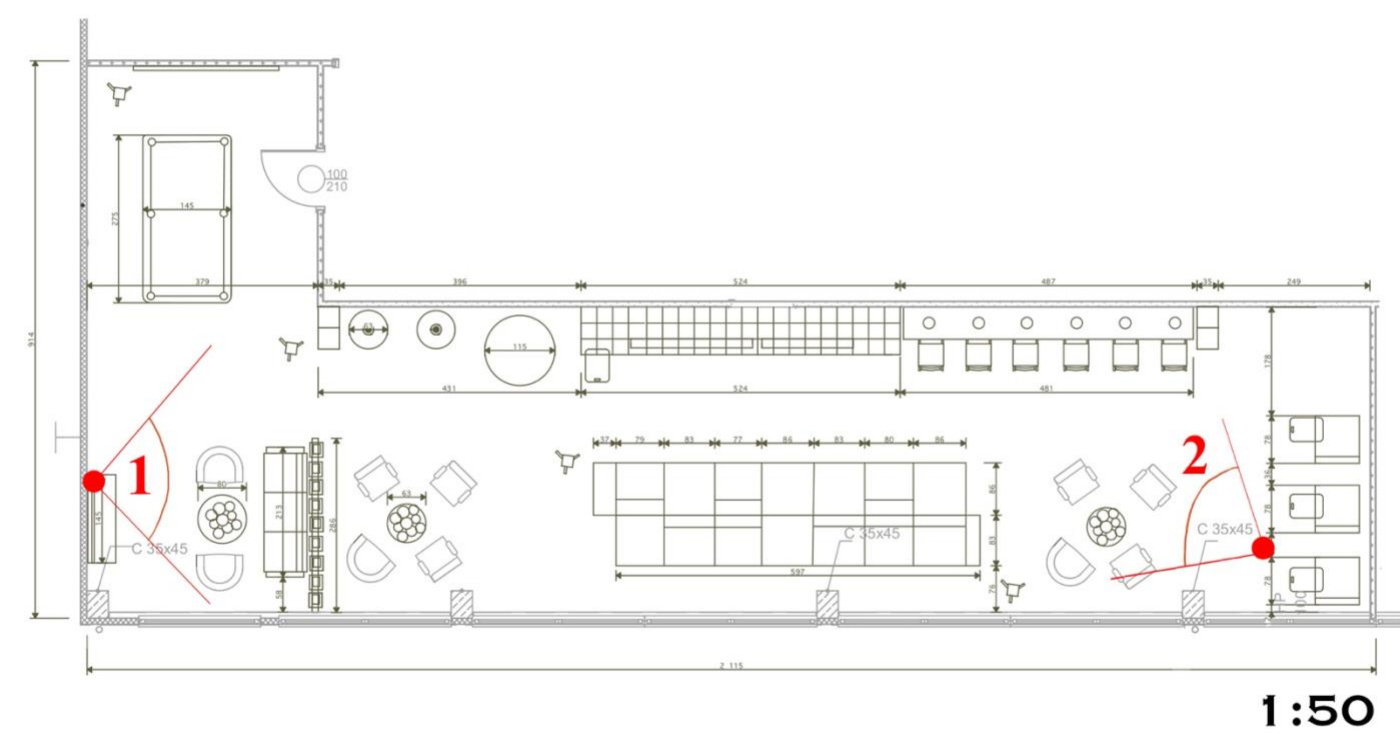


Figure 25. Armchair „klubowy“ inspired by PRL Design – designed by Mariusz Chierowski.



Figure 26. Metal barstool - 03/Mr Alu/H produced by SOLID BASE

CREATIVE ROOM



1 CREATIVE ROOM VISUALIZATION



2 CREATIVE ROOM VISUALIZATION

materials



Nephrolepis

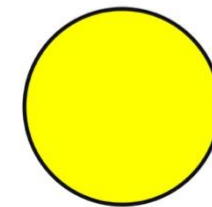
Sansevieria trifasciata



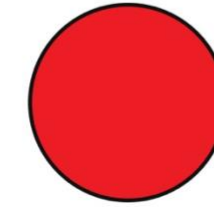
Schefflera arboricola



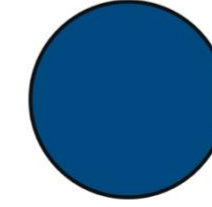
architectural concrete



yellow



red



blue

key elements

Representatives of different generations work in Kolanko company. However, the dominant force is the so-called Millennial Generation, people born after 1980. Their preferences and habits affect the appearance of the office space. Employees who are 24-36 today have new technologies in their blood. The use of a smartphone or digital camera and the social media is completely natural for them. They are bombarded with various information all the time. The variety they experience and their changing lifestyle are the lifeblood of evolution in office design. 41% of Generation Y representatives prefer to work in a team, and 32% appreciate informal meeting places rather than conventional (CABE, 2005).

Referring to the preferences of employees this project contains both private rooms and rooms for teams. This office space is a compromise between hot desks⁵ and cellular office⁶. Everyone has their own desk and chair and their own space, but the workstation is not assigned to a specific employee. The advantage of such solution is that the employee sitting in various places of the office naturally meets other employees and it often improves the flow of information.

The office has a few small rooms for tasks requiring concentration. It is a small rectangular space equipped with a desk and office chair (figure 27), a cabinet for documents, a table, two armchairs 'klubowy' and a plant pot. As a result of having large windows, the whole space is well-illuminated and it is possible to introduce plants. The species that was selected to this room is Peace Lily. This plant has the ability to purify air from toxic substances, inter alia, caused by furniture, floor-covering and plastic casing of electronic equipment. What is more, it is a flowering plant and its flowers are an extra office decoration.

Just like the other office spaces there is architectural concrete on the walls and linoleum on the floor. A color accents are used in this room in the form of yellow armchairs, a red chair and a radiator in a shade of blue. To isolate this room from others, sound absorbing panels (fluffo⁷) were used. These fluffo panels are soft, three-

⁵ Hot desking – an office organization system which appeared already in the 1980s. The workstations are not assigned to an exact employee. A worker does not come to work every morning to take the same place - he uses a desk that is free at any given moment and takes his belongings after finishing work.

⁶ Cellular office – a contrast to open-space. Individual offices are isolated from the others by permanent walls.

⁷ Fluffo – acoustic panels made of flexible, thick, polyurethane foam. The surface of the panels are covered by the Fluffo structure (these are millions of microscopic colored polyamide fibers that are densely 'packed' next to each other and feel like velvet in touch).

dimensional and they are characterized by sound absorbing properties. In addition, they are an interesting wall decoration. In a private office, three different shades of red are chosen as a color referring to company's logo. Due to their perfect noise absorbing characteristic a private room is appropriate to perform tasks requiring concentration and silence. The presence of plants affects the well-being of employees and increases their creativity.

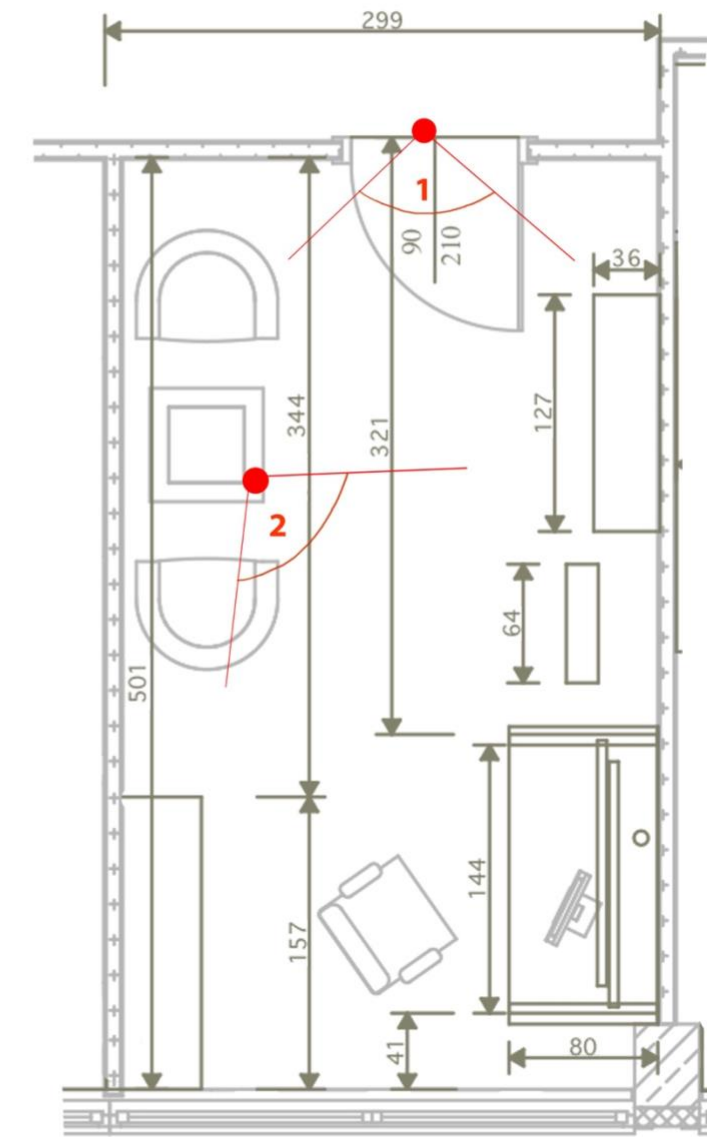


Figure 27. Office chair Q-040 produced by SIGNAL MEBLE

PRIVATE OFFICE



1:100



1:50



1 PRIVATE OFFICE VISUALIZATION



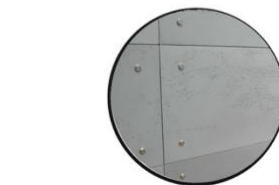
2 PRIVATE OFFICE VISUALIZATION

materials



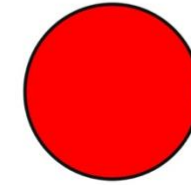
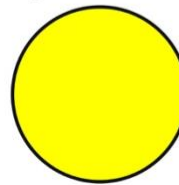
Spathiphyllum

beech wood



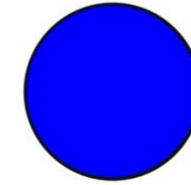
architectural concrete

yellow



red

blue



key elements

Another space designed for work is an office dedicated to architects team. Team workspace is a specific example of the office that supports the activities of highly interactive, multi-disciplinary teams. A common design approach is to provide an open areas that support informal group collaboration. Providing different type of workstations gives staff the opportunity to choose the best space for their task.

The team of architects, consisting of 4 people, has a shared office equipped with two desks at their disposal, each dedicated for two people. One desk is fitted with automatic height adjustment for sitting (Office chair Q-040) and standing work (figure 29). Standing desks allow people to stretch their legs. Second desk is wider and dedicated for drawing and designing. This desk also has the ability to change the angle of the tabletop, which facilitates drawing and a chair is very comfortable (figure 29). All desks are white because a lot of businesses have found that white office furniture actually raises productivity. White surfaces also reflect light, which makes the workstation and the entire room appear bigger than it is in reality. Additional furniture in this room are wooden seats designed below the window, two armchairs and a table. This zone both complies with leisure area and a meeting space for clients. There is also a space for storage of documents, and a few bookshelves hanging on the wall. There are acoustic panels on the wall that absorb noise.

Plants are practically mandatory for the designers. The windows are equipped with special constructions supporting climbing plants and also there are a few plants dotted around the room to keep the place feeling alive and fresh. A workplace's atmosphere and surroundings can inspire employees to be more efficient and passionate about their work.



Figure 29. Office chair ARCA available at <http://www.krzesla-biurowe.pl/o/Profim/fotel-recepcyjny/Krzeslo-Recepcyjne-Profim-Arca/krzeslo-konferencyjne-Arca-21V-PP.html#element>

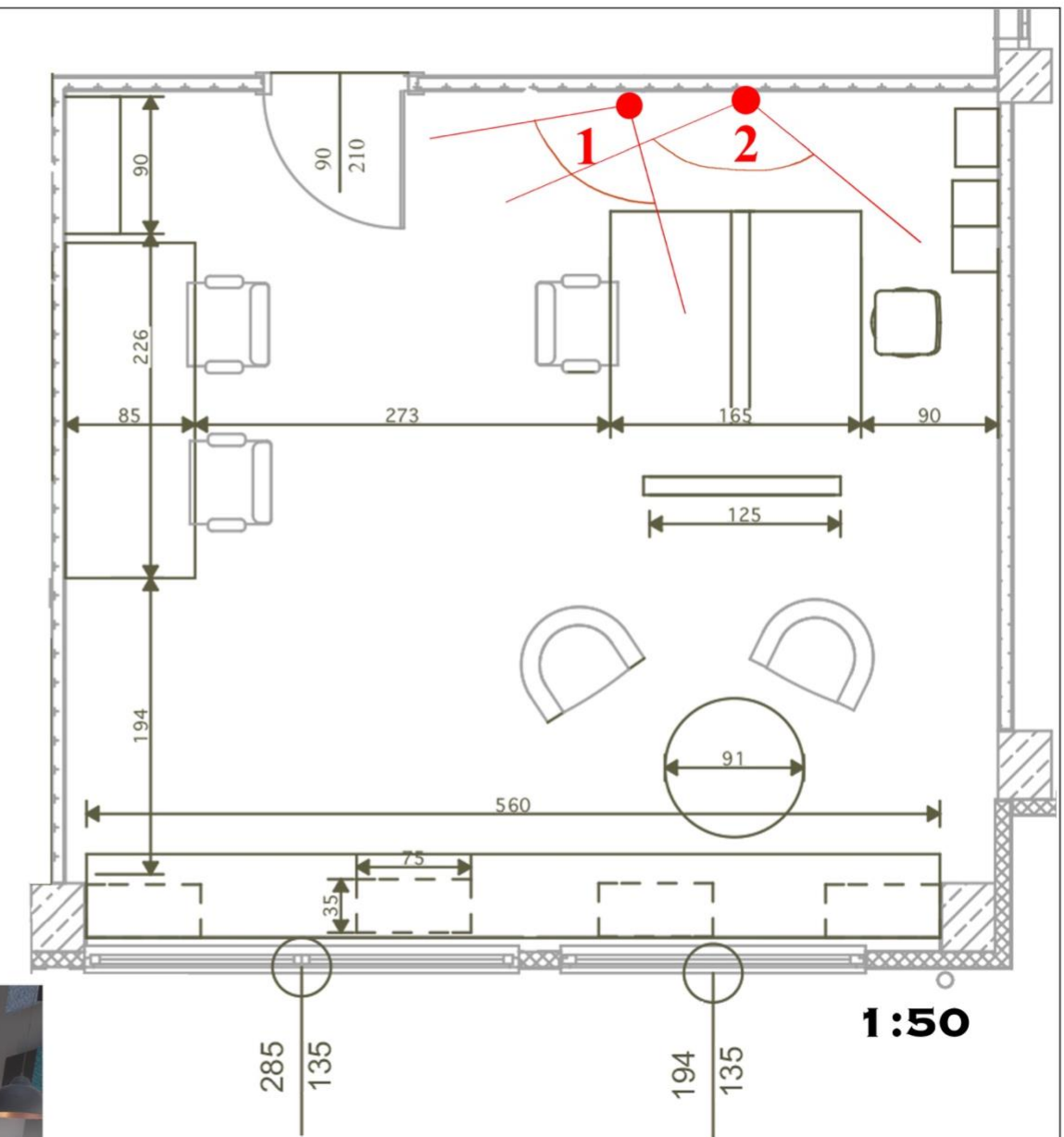


Figure 30. Barstool ,Porti' available at ehokery.pl

INTERIOR DESIGN TEAM'S OFFICE



1:100



1:50



1 CO-WORKING OFFICE

2 CO-WORKING OFFICE

materials



Hedera helix

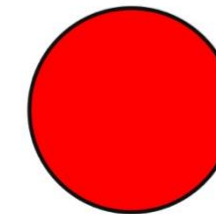
beech wood



architectural concrete

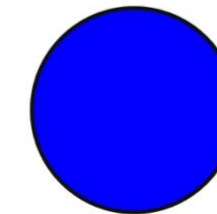


Nephrolepis exaltata



red

blue



key elements

According to the Society for Human Resource Management research, every fifth employer provides its employees with access to a selected gym or fitness center. Most often these are gyms located near the office, in business centers. In the case of the Kolanko company, both the gym and the sauna were designed inside the new headquarters of the company.

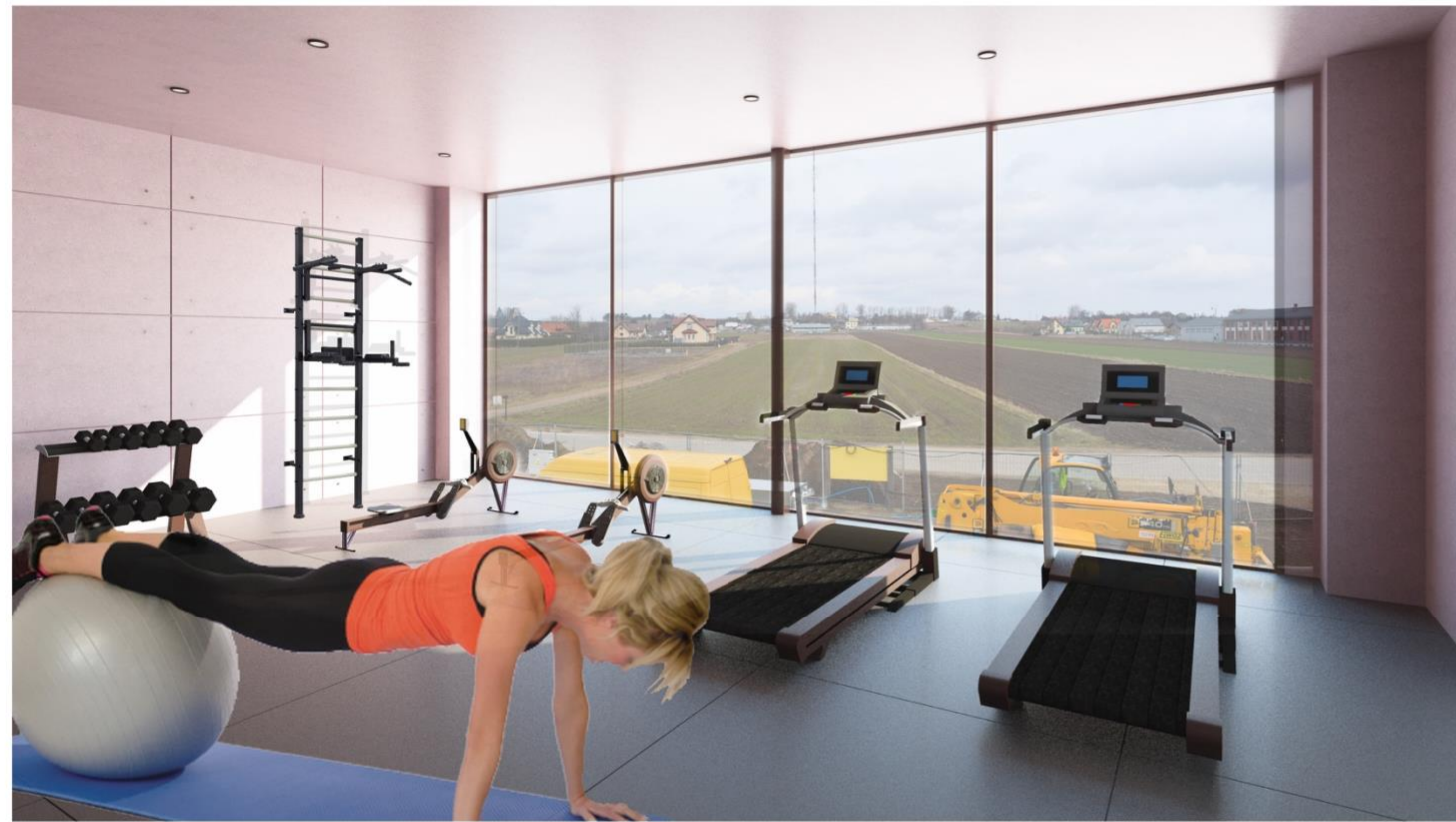
Due to the possibility to workout at work employees can stay fit and healthy and in turn they are happy and more productive. What is more, exercises allow workers to relax, that is why it is recommended to go to the gym during lunch break.

Another benefit of the gym is providing better relationships between employees. Common workout contribute informal talks and exchange of views.

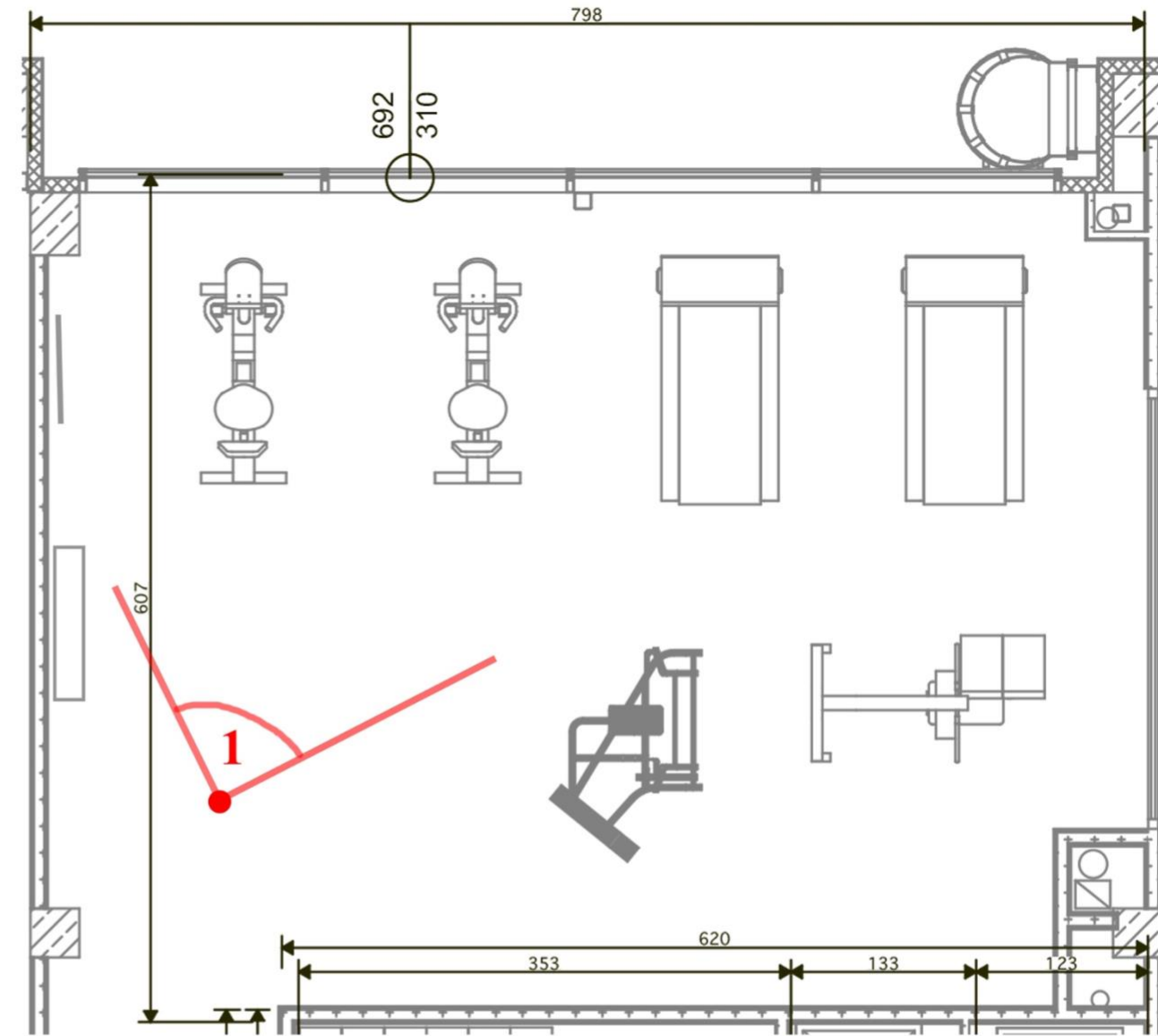
GYM



1:100



1 VISUALIZATION OF GYM/FITNESS



1:50

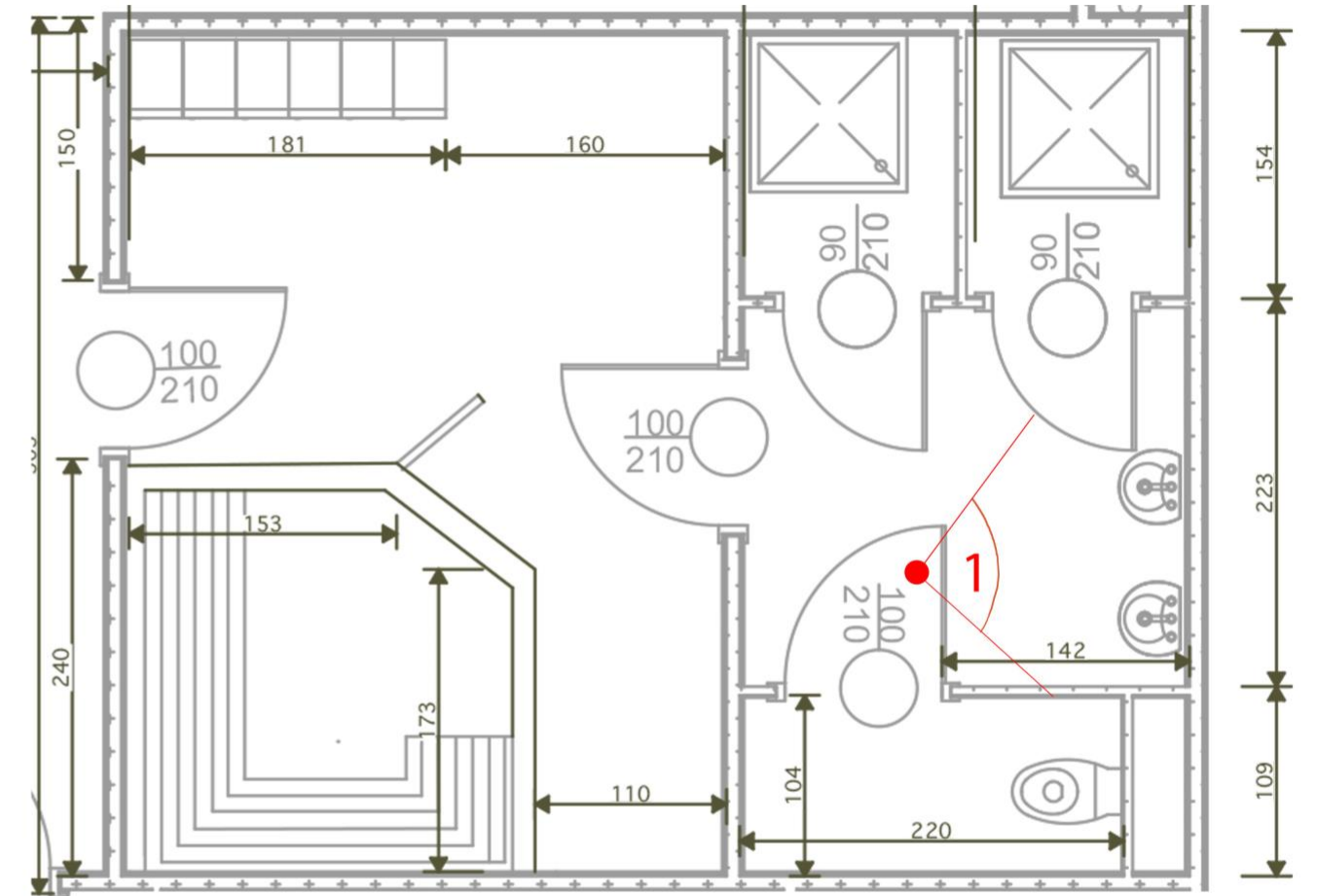
2 DIMENSIONING OF GYM

The next room is the space that must be in every building - bathroom which is located in the vicinity of the gym. However, in addition to physiological functions, it plays a relaxing role because of the sauna that is located there. The room is located in the immediate vicinity of the gym, hence the idea to create a place of relaxation in the bathroom. The bathroom consists of five separate rooms. In two of them there are showers, one is designed as a toilet, another is equipped with a sink in a shape of bucket (figure 31) and a mirror, and the largest one has a sauna and cabinets where employees can leave their clothes and belongings. Like in other rooms, walls are covered with architectural concrete with the exception of the toilet where black tiles are on the walls. Moss panels are used in the project as a decorative element. The tiles are made of natural moss (*Cladonia ragniferina*), which needs only about 40% of air humidity for life. It does not need an additional irrigation or fertilizing system. It does not require trimming and can be used in rooms where there is no access to natural light. In addition, due to the process of preparation, moss panels have antistatic properties and dust does not settle on them. Providing suitable conditions, this decoration will keep its unique character for many years.



Figure 31. Sink in a bucket shape - SCARABEO BUCKET

BATHROOM WITH SAUNA



Moss panels



Sauna



1

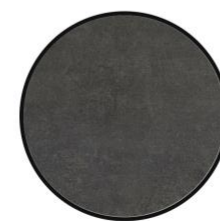
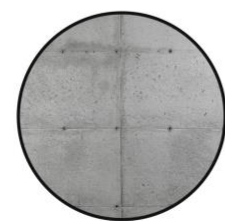
BATHROOM VISUALIZATION

2

TOP BATHROOM VISUALIZATION

materials

architectural concrete



linoleum

moss



key elements

A kitchen in the office with a place to eat meals is a standard nowadays. As it turns out, this is not just a place to eat. Researchers say that this room is much more important in any organization. Most often in the kitchen, the employees spend breaks and they meet with colleagues, and the issues regarding work and office are put aside. In the kitchen, employees can relax, regain strength, eat something and drink coffee. Undoubtedly, it is a place of employees' integration. It should be remembered that coffee break⁸ in the kitchen is one of the key elements for communication in the company.

First of all, the kitchen should be well-equipped. Therefore, the project contains a line of low cabinets located on the right side of the entrance. This part includes also a refrigerator, an oven with microwave function, an induction hob and a two-part sink. In addition, the kitchen was equipped with a coffee maker, electric kettle, plates, cups etc. The cabinets are designed from durable and easy to clean materials. Front of cabinets is made of beech wood, and countertop is constructed of acrylic-mineral material Reston⁹. Reston is ideal for a kitchen counter because it is: durable, solid, smooth, easy to keep clean and renovate and has good functional characteristics. Moreover, it does not absorb liquid and does not discolour.

A wooden table is mounted to the wall. There are 6 barstools (figure 32) around the table. On the countertop there is a steel frame with lighting and hanging plant pots attached to it. Kitchen is a room, where there is no access to natural light, a plant species has been carefully selected to cope with such conditions. *Zamioculcas zamiifolia* is a potted flower known by several names – the ZeeZee Plant, the Aroid Palm and „Eternity Plant“. It is easy to grow and care for. What makes this species a perfect office plant is fact that it handles low indirect light, water scarcity and moisture shortage very well. The *Zamioculcas* neither need special type of potting soil, nor special fertilizer.

Three of the four walls are made of white tiles with dimensions 100 x 200 x 12 mm. Walls are covered with ceramic tiles in subway type, a simple, classic, monochromatic, lengthwise tiles. By contrast one of the walls is painted with chalk paint, which can be used as a board for leaving notes for colleagues or for logging ideas.

⁸ Coffee break - is a term specifying the practise of drinking coffee during a short break at work, popularized in America, mainly by the Pan American Coffee Office in 1952. In Poland typically, a coffee break lasts 10-15 minutes and takes place at the end of one-third of the work shift (in most companies in Poland there is no lunch, break just a coffee break). In some companies the coffee break is officially scheduled for the given hour.

⁹ Reston – is an acrylic-mineral material used in construction and furniture design. It is a homogeneous stone-like surface material, very often used in the production of kitchen countertops.

Finally, it is worth recalling that the kitchen, apart from the obvious functions, should also be a place where employees meet and talk, which sometimes leads to new ideas and solutions. To obtain this effect, elements such as plants, blackboard paint, proper lighting, ergonomic furniture and good quality kitchen equipment are designed. The project attempt to create a space where the employee would feel good and a space, which could inspire him

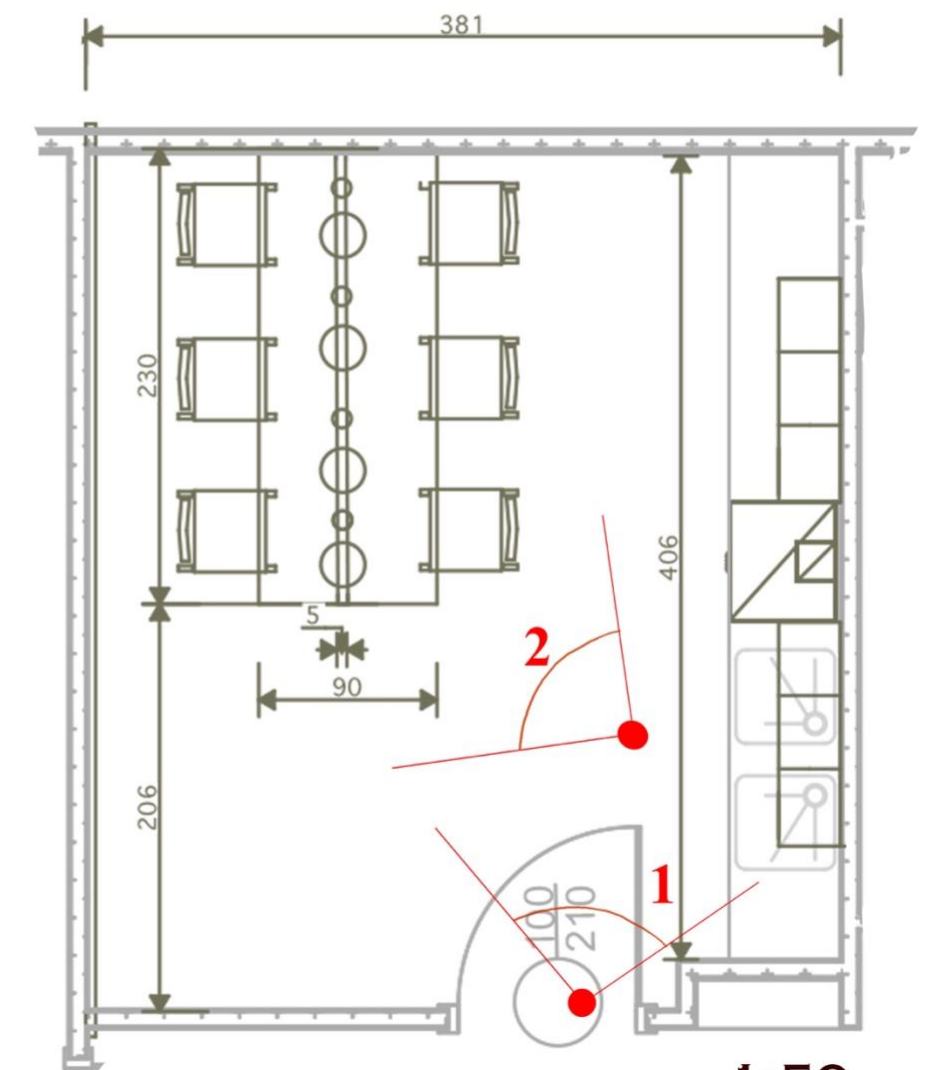


Figure 32. Bertioia counter stool designed by KNOLL

KITCHEN



1:100



1:50



1 KITCHEN VISUALIZATION



2 KITCHEN VISUALIZATION

materials



Zamioculcas zamiifolia

white wall tiles



blackboard paint



blackboard paint

beech wood

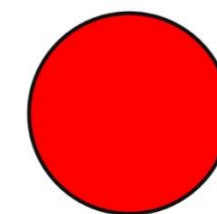


mineral-acrylic slab



mineral-acrylic slab

red accent



red accent

key elements

The most representative room is the president's room. Interior design of president's office fully reflects the status and success of the company. The perfect organization of space, comfortable and ergonomic furniture contribute to effective work. In order to make the office comfortable for work and for meetings, the interior is divided into two areas in terms of functionality. Great attention was paid to the aspect of interior lighting, both artificial and natural light. An interesting solution for combining functionality and beauty is hanging garden light which is located above the table in rest zone. Toronto-based designer Ryan Taylor has created this lamp called Babylon. It is made from powder-coated aluminum that also features a small garden. This pendant lighting adds a cozy character to an interior of concrete walls. Architectural concrete and light beech wood are materials used in the boss's office. To create a comfortable rest and meeting area a cozy seating such a sofa and two armchairs (figure 33) were introduced.

A workstation for the boss is equipped with large desk in a rounded form and ergonomic chair (figure 34) with height adjustment. The same as in other offices, there are acoustic panels on the wall. In addition, there is a TV screen and a projector which facilitate and provide professional presentation during meetings. From this room there is a passage to the meeting room.



Figure 33. Armchair ,muszelka' PRL DESIGN

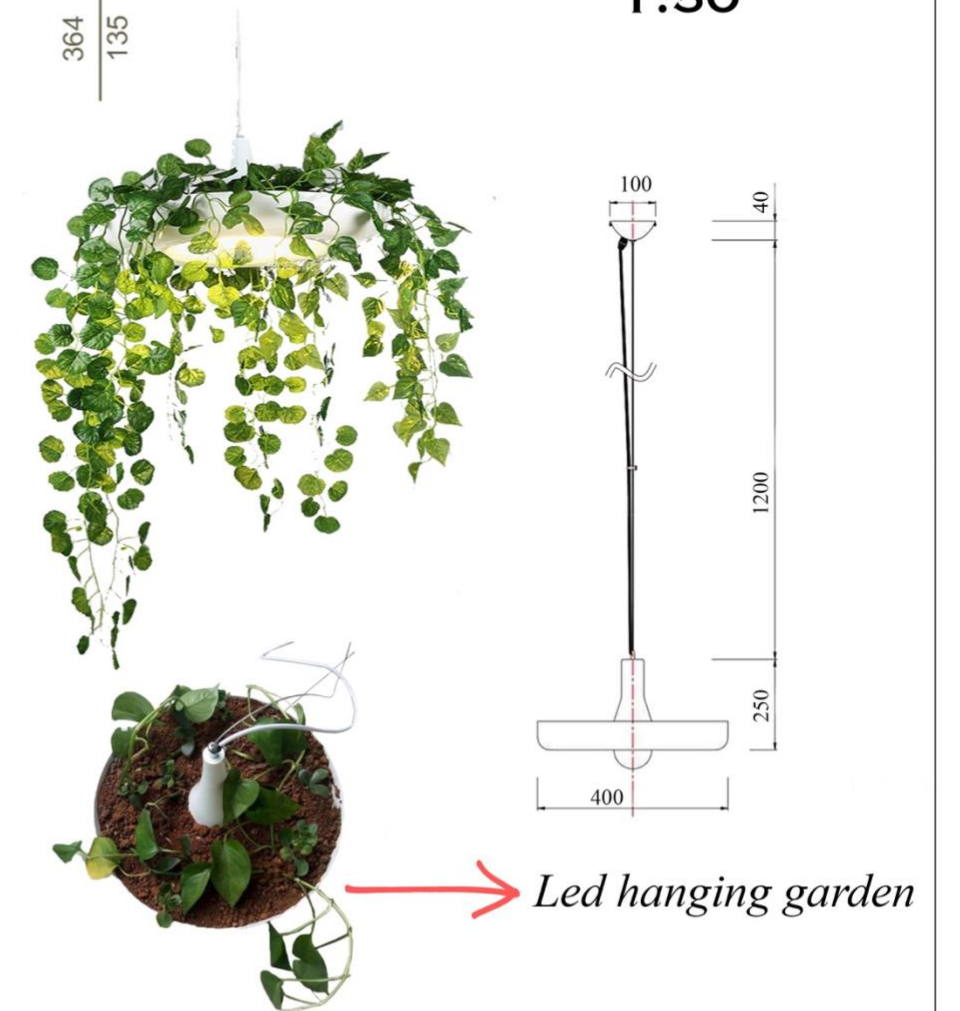
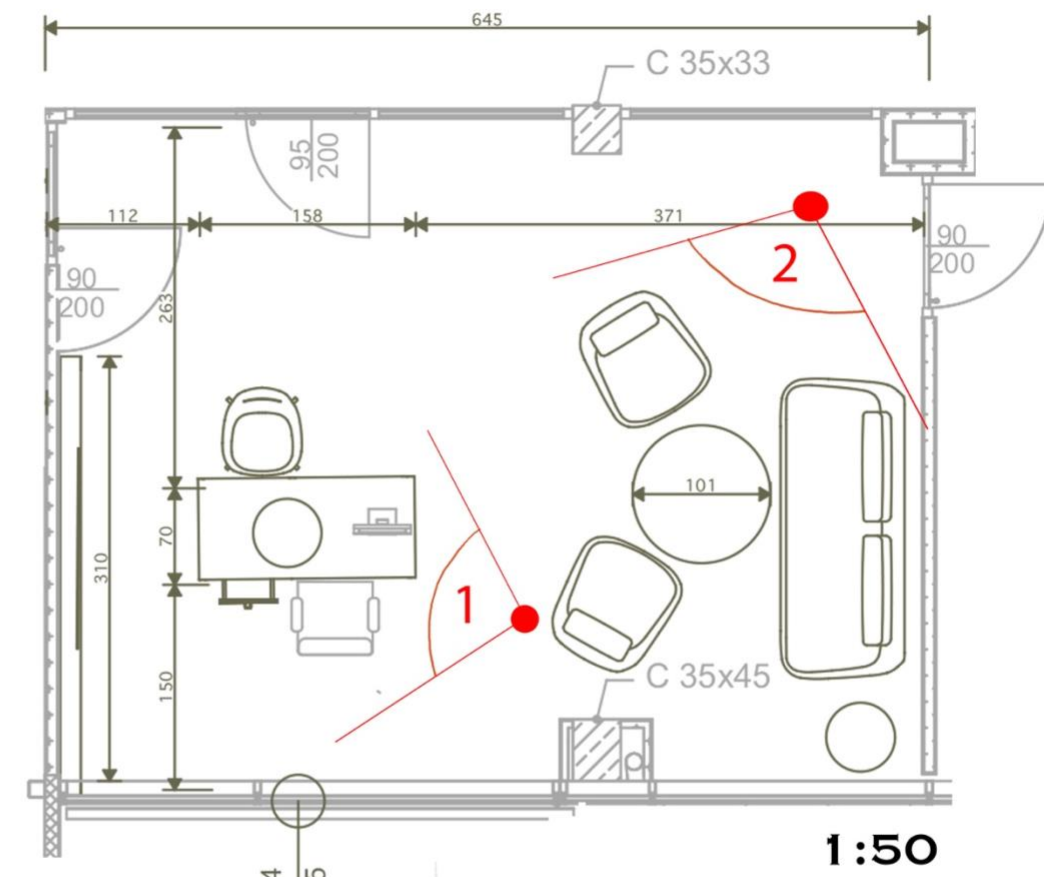


Figure 34. 'Jajo' chair – The inspiration of the 'Jajo chair' was the design of Arne Jacobsen - Egg Chair. Available at <https://www.superwnetrze>.



Figure 35. Danish retro sofa. Available at <https://www.retrospectiveinteriors.com/product/danish-retro-sofa-bed-vintage-1950s/#prettyPhoto>

BOSS'S OFFICE



1 VISUALIZATION OF BOSS OFFICE

2 VISUALIZATION OF BOSS OFFICE

materials



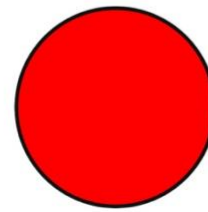
Hedera helix

beech wood



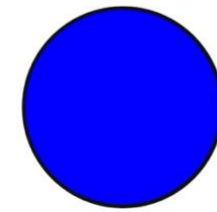
architectural concrete

Sansevieria trifasciata



red

blue



key elements

Meetings are a huge part of working life. Well-designed meeting room can improve the content of a meeting, encourage conversation, and induce creativity. Meeting room design is directly related to how meetings go and how presentations are received.

The conference table is the heart of the meeting room. In the project for the Kolanko company, the wooden table is located in the central part of the room and has dimensions of 270 cm length and 100 cm width. Thanks to such dimensions it is possible to set six comfortable chairs (figure 33) at the table (four in red and two in gray color) . In the center there is a modern bubble pendant lamp above the table. To facilitate the presentation and to give an opportunity to save ideas one of the walls is covered with chalkboard paint.

The design is one thing, but the multimedia equipment of the room is also important, so it meets all the requirements. Proper selection of devices increases the efficiency of operations, facilitates transmission and consolidation of information. Appropriate equipment of the conference room in multimedia (screen, projector, sound system) guarantees the participants of trainings or conferences comfortable conditions of reception of the subjects presented to them. Effective meetings are crucial in providing smooth operation and teamwork of any business. The project sought to include all elements that affect the course of meetings by using comfortable, ergonomic furniture, multimedia and plants.

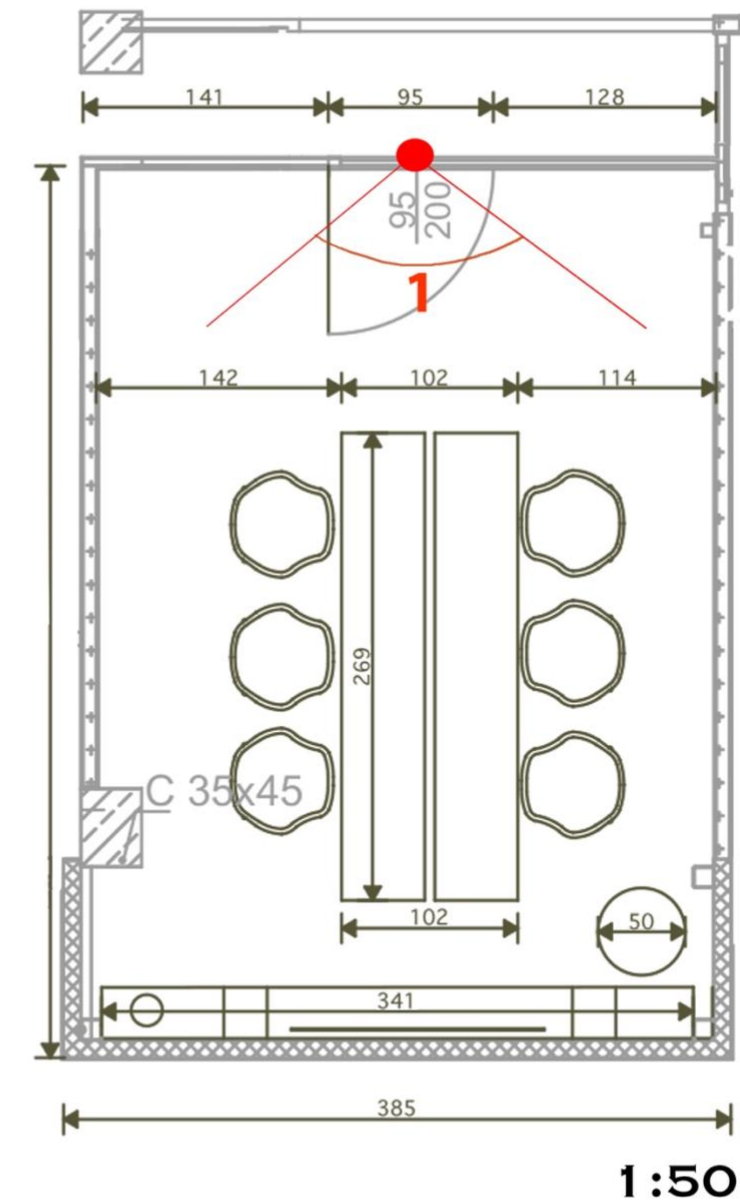


Figure 34. SEDIA IGLOO CALLIGARIS

MEETING ROOM



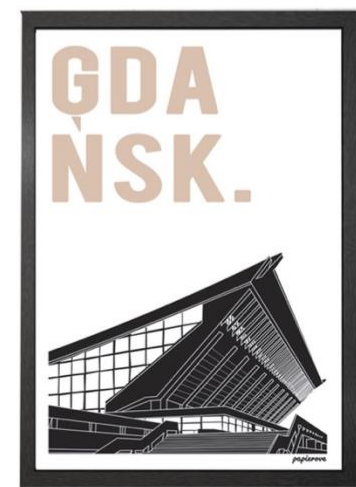
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1 VISUALIZATION OF MEETING ROOM



→ A poster showing the building of the Oliwia Hall located in Gdańsk, closest city to Kolanko Company

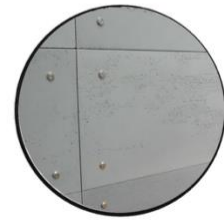
materials



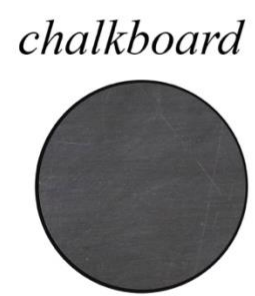
Sansevieria trifasciata



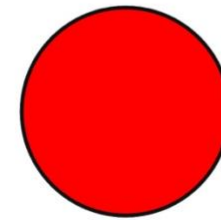
beech wood



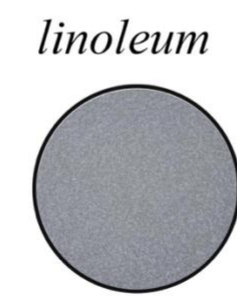
architectural concrete



chalkboard



red



linoleum

key elements

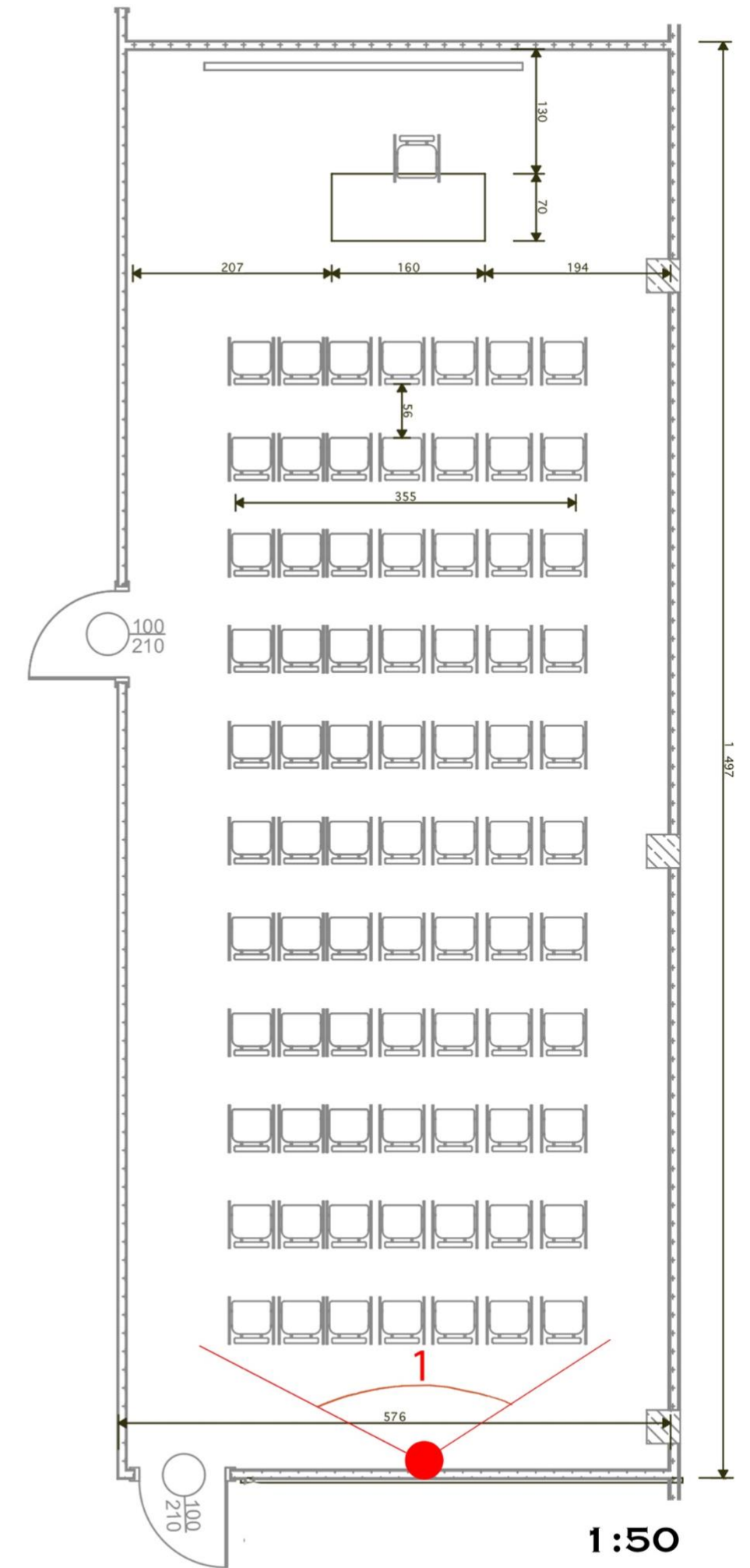
CONFERENCE ROOM



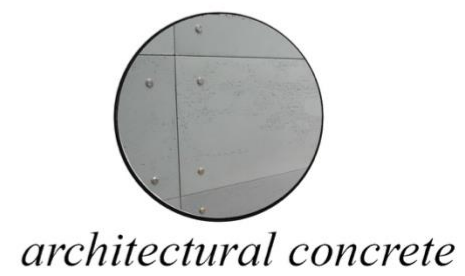
1 CONFERENCE ROOM VISUALIZATION



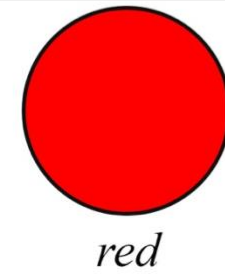
Quilt, Armchair designed by Olle Anderson



materials



key elements



In order to maximize employee's ability to work effectively, they were given a possibility to choose a space where they want to work and how they want to rest. A large variety of rooms are able to meet the requirements of almost everyone and to provide employees with the best possible working conditions. Ergonomics and selected design meet the norms of working conditions but also improve well-being, reduce stress (for example, acoustic panels absorb noise, thanks to which it is possible to focus on the work) and raise the aesthetic value of the building.

What is more, nowadays office is treated as a tool used for creating the image of an attractive employer. It is a perfect element to encourage employees to work and to keep the most talented people at the company. New headquarter of Kolanko company are definitely

6. CONCLUSIONS

Based on the research cited in this study, it is clear that stress level, productivity, creativity are directly related to indoor conditions, environment and work space design. Well-designed workstation brings benefits both for employees and employers. It is a factor, which help employers to recruit well-qualified workers. Employees spending their time and working in modern and functional office are able to work better and faster and feel well at the same time.

Office for Kolanko Company was planned based on research and design techniques which are described in the thesis. At the beginning, before doing a project, it was necessary to review the literature. Different theories and techniques allow to understand better the theme of office design and provide a source of ideas, inspiration, solutions for project. There are two issues, which are raised in this study: 1) reducing the stress of employees at work, 2) increasing worker's productivity. Studies show that a well-designed office not only affects the well being of employees, but also their productivity. The cost of health care is variable the same as an amount of free days taken because of health problem.

The final office layout was designed to ensure the best conditions for employees to work, to boost their creativity, productivity, ensure well-being and promote collaboration. Obviously the whole project is in line with the goals that the company has set and with its business and marketing strategy. One of the company goal is to create a representative space, where is possible to meet clients, business partners, architects.

An important aspect of conceptual design was the use of ergonomic furniture and a plants as a factor ensuring people's well-being. New layout was designed to boost collaborations between employees and to improve service. The project includes both rooms for work in groups (small and large), private rooms and open space called a creative room. A significant component of stress menagment programme is a relaxation area, gym, bathroom with sauna and cofeeshop. These spaces were designed to promote relaxing stress-free atmosphere at work what in turn contribute to increased productivity.

Augmented amount of daylight, plants ware introduced to increase worker's ability to achieve goals at work and at the same time to redound to improve overall morale. Nowadays, office work consists mainly in the reception and processing of data. The human eye provides the most information (approximately 80-90%). That is why it is

so important to provide good lighting conditions in workplaces. Adequate lighting brings many benefits: direct and clear productivity growth, reduced accidents and mistakes made at work as well as improved overall working atmosphere.

In addition, materials, colors were carefully selected to take advantage of all the benefits, which could be derived from them. It is not without significance that the red color was used in the project. It does not only refer to the company's logo but also it has a stimulation power.. Red is the color of achievement, power and control. The red color has an impact on better memorization and better solution of tasks based on avoidance and on those in which employees need to focus on the details.

All the above-mentioned elements such as increased amount of light, selected colors and materials, ergonomic furniture are just a few techniques that can be used in designing office space to achieve the goal of high productivity and creativity of employees with a minimum of stress. Available research on this specific topic indicates that both interior and exterior design influence the employee's work but also how customers perceive this work.

Finally, both published scientific papers and employee responses show that using design it is possible to contribute to better job performance, a better customer service and a company's impression.

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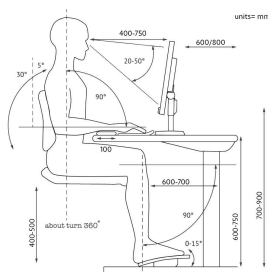
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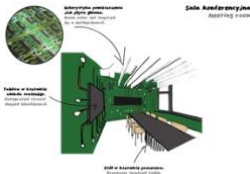
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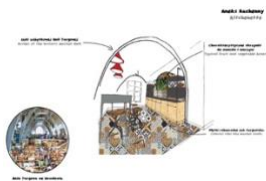
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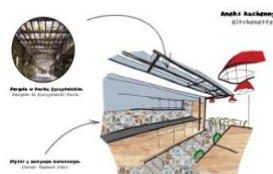
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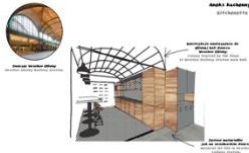
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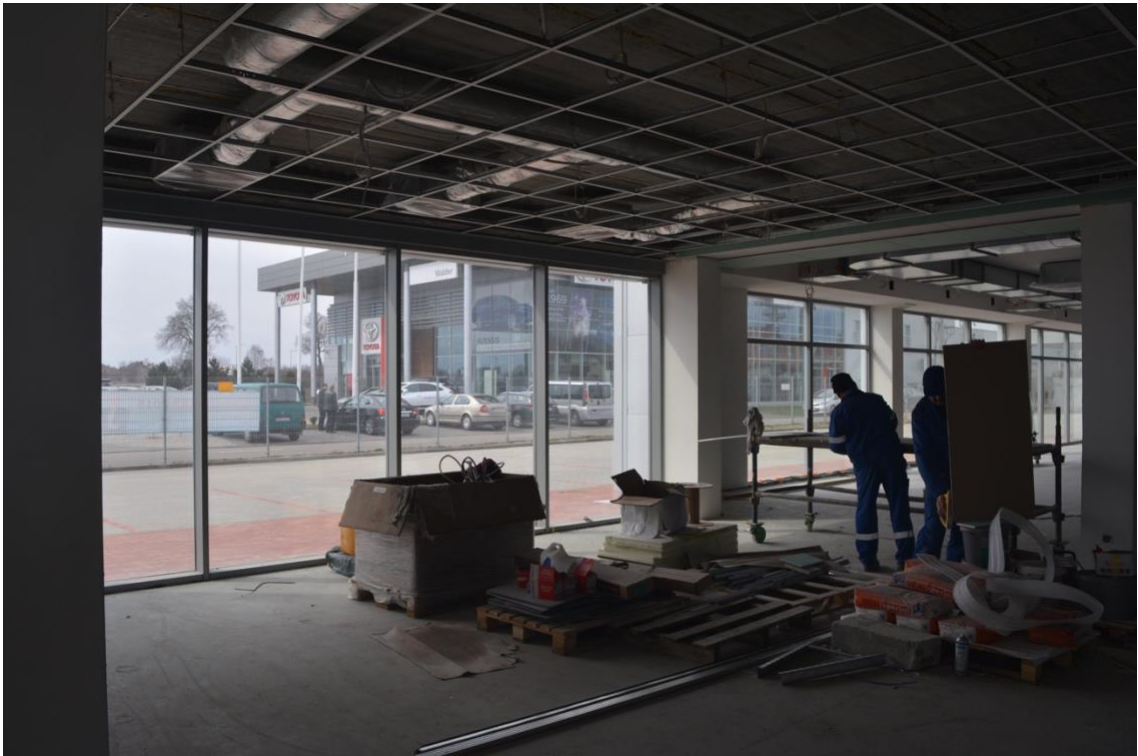
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ANNEXES

PICTURES OF WORK CONTACTS















SURVEY 1

EMPLOYEE SURVEY

*Please take a few minutes to tell us about your office design
and about your workstation satisfaction*

1. Are You able to be concentrated at work?

What do You think about silence level at work?

————— ————— ————— —————

poor **fair** **good** **very good** **excellent**

2. Are the lighting conditions good for work?

————— ————— ————— —————

poor **fair** **good** **very good** **excellent**

3. How do you feel about privacy level at office?

————— ————— ————— —————

poor **fair** **good** **very good** **excellent**

4. Have the layout got a good influence on employees collaboration?

————— ————— ————— —————

poor **fair** **good** **very good** **excellent**

5. What do You think about decoration at work?

————— ————— ————— —————

poor **fair** **good** **very good** **excellent**

SURVEY 2

WHICH ELEMENT OF OFFICE DESIGN IS THE MOST IMPORTANT?

Using numbers from 1 to 10, put elements that are more important to you at work in order.

1 - the most important, 10- significantly less important.


- LIGHT
- DINING ROOM
- ERGONOMIC FURNITURE
- DECORATIONS
- COLORS
- PLANTS
- PRIVACY
- COLLABORATIONS
- REST ZONE
- SILENCE

REPORT OF HAYS, KINNARPS, SKANSKA COMPANY – DO NOT BE AFFRAID OF ACTIVITY BASED WORKING

HAYS Recruiting experts
worldwide

Kinnarps

SKANSKA



Opracowanie 2017
**NIE BÓJ SIĘ
ACTIVITY
BASED
WORKING**

NOWE BIURO?
POTRZEBA ZMIANY?
RYNEK PRACOWNIKA?

Dowiedz się, jakie środowisko pracy
może oferować Twoja konkurencja.

Nie bój się! Sprawdź, co warto wiedzieć
na temat ABW – może to rozwiązanie
właśnie dla Ciebie!

Środowisko pracy ulega ciągłym przemianom. Świat i Polska przechodzą obecnie transformację, która wprowadza na rynek młodsze pokolenie pracowników oraz nowoczesne technologie. Już dziś wiele osób pracuje zdalnie, nieraz wykonując w ten sposób większość swoich zadań. Czy w takim razie obecne biura są dostosowane do aktualnych potrzeb pracowników i wyzwań biznesowych?

Koncepcja Activity Based Working (ABW) sprawia, że biuro jest przestrzenią elastyczną, która dopasowuje się do użytkowników oraz charakteru ich działań.

Hays, Kinnarps i Skanska to organizacje, dla których przestrzeń pracy różnych pokoleń i temperamentów jest niezwykle ważna, choć nacisk kładziemy na różne jej elementy. Wieloletnia, bliska współpraca z pracodawcami i najemcami powierzchni biurowych na polskim rynku pozwoliła nam poznać różnorodne doświadczenia oraz opinie na temat aranżacji i funkcjonalności biura.

Znamy bieżące potrzeby firm, jak również oczekiwania pracowników względem przestrzeni pracy. Zauważamy, że nowoczesne biuro, umożliwiające pracownikom dobór miejsca do charakteru obecnie wykonywanego zadania, przestaje być traktowane jak ciekawostka na rynku. Czy porzucenie tradycyjnej koncepcji biura staje się koniecznością dla organizacji, które dążą do dalszego rozwoju technologicznego i otwarcia się na różnorodność potrzeb pracowników?

Szybko postępująca transformacja środowiska pracy oraz obowiązujących standardów biurowych zainspirowała nas do przeprowadzenia badania na temat aranżacji przestrzeni pracy oraz jej roli w realizacji celów firmy i strategii pozyskiwania najlepszych pracowników. Badanie zostało przeprowadzone w sierpniu 2016 r. na niemal 100 firmach, łącznie zatrudniających ponad 50.000 osób. Publikację uzupełniliśmy dostępnymi raportami, wnioskami i komentarzami ekspertów. Zapraszamy do lektury.



Paula Rejmer
Dyrektor Zarządzająca Expert Perm
Hays Poland



Beata Osiecka
CEO Kinnarps Polska,
Head of CEE Region



Ewelina Kaluźna
Dyrektor ds. wynajmu i zarządzania wartością
budynków, Skanska Property Poland



4 | Nie bój się Activity Based Working

NIE BÓJ SIĘ ACTIVITY BASED WORKING

Głównym wątkiem niniejszego raportu jest koncepcja Activity Based Working (ABW), która zakłada przede wszystkim, że to, co nazywamy „pracą biurową” nie ma jednolitego charakteru, lecz składa się z rozmaitych czynności, wykonywanych indywidualnie lub zespołowo, wymagających innego stopnia koncentracji uwagi, nakładu czasu oraz otoczenia.

Najczęstszym błędem jest utożsamianie ABW ze sposobem aranżacji wnętrza. Tymczasem przestrzeń zaplanowana zgodnie z tą koncepcją jest jedynie najbardziej widocznym rezultatem jej wdrożenia. Według Activity Based Working biuro jest narzędziem do zarządzania zespołem w oparciu o samodzielność, autonomię i gotowość do zmian ze strony pracowników. Pełne wykorzystanie możliwości, które daje taka przestrzeń biurowa jest możliwe dzięki kulturze organizacyjnej zbudowanej na zaufaniu.

Dlatego też nadrzędnym celem koncepcji ABW nie jest pozbawienie pracowników własnych biur, lecz dogłębne zbadanie charakteru pracy (obecnego i planowanego) i wybranie tych elementów, które są najbardziej istotne. We współczesnych biurach nie chodzi o zmieszczenie jak największej grupy pracowników na określonej powierzchni, ale o to, aby z określonej liczby metrów kwadratowych wydobyć jak najefektywniejsze wykorzystanie czasu i potencjału pracowników. Biura mają przede wszystkim służyć współpracy i twórczym, wartościowym interakcjom.

Sylvia Pędzińska
Partner, Dyrektor
Działu Workplace
Innovation, Colliers
International



Przestrzeń zorganizowaną według zasad ABW, można określić angielskim hasłem „voice & choice”. To środowisko optymalnie dopasowane do potrzeb konkretnej organizacji. Takie, w którym pracownicy mają możliwość wyboru przestrzeni najbardziej odpowiadającej wykonywanej w danym momencie czynności („choice”). Oprócz możliwości wyboru, równie ważny jest wpływ na kształt swojego środowiska pracy i nadania mu unikalnej tożsamości, z którą pracownicy mogą się identyfikować („voice”).

Nie bój się Activity Based Working | 5

KONCEPCJA DOSKONAŁA

Raport z holenderskiego projektu badawczego autorstwa Susan Smulders i Denise Clarijs pokazuje, że miejsca pracy oparte na aktywności często stają się katalizatorem rozwoju lepszego środowiska dla działaczy zawodowych. Pracownicy zaczynają w sposób zupełnie spontaniczny poddawać w wątpliwość utarte schematy i rzucać im wyzwanie.

Podczas trwającego pięć lat projektu badawczego Smulders i Clarijs przeprowadziły rozmowy z ponad 5.000 pracowników biurowych, z których wynika jednoznacznie, że elastyczne biuro wzmacnia ich dobre samopoczucie i wspiera rozwój kompetencji.

Poprzez zastosowanie koncepcji Activity Based Working firma ma możliwość zaktualizowania swojej wiedzy na temat funkcjonujących w niej wzorców pracy, ich adekwatności do obecnych wyzwań oraz bieżącej oceny stopnia, w jakim biuro wspiera realizację celów biznesowych. Systemowe podejście uświadamia, jak dynamicznie pod wpływem trendów technologicznych, demograficznych i zarządczych zmienia się specyfika pracy biurowej na przestrzeni ostatnich kilku lat.

Korzyści dostrzega również kadra kierownicza. Aż 34% zarządzających zauważyło, że może przekazać pracownikom więcej obowiązków, niż miało to miejsce w innych warunkach.*

*Raport z projektu Susan Smulders i Denise Clarijs, Kinnarps Polska 2016.

NIEMAL 70% PRACOWNIKÓW ZAUWAŻYŁO,
ŻE PRACA W ŚRODOWISKU OPARTYM
NA AKTYWNOŚCI DODAJE IM ENERGII,
POZWALA OSIĄGAĆ LEPSZE EFEKTY
I JEST BARDZIEJ STYMULUJĄCA.*



*Źródło: Raport z projektu Susan Smulders i Denise Clarijs, Kinnarps 2016.

RYS HISTORYCZNY

Narzędzia pracy: papier, ołówek, pióro

- Korytarzowy układ biura;
- Początki open space;
- Burka w rzędach, pracownicy skierowani przodem w jedną stronę (na wzór taśmy produkcyjnej);
- Miejsca w burze odzwierciedla pojęcie w hierarchii;
- Kontrola, dyscyplina i rutyna w organizacji pracy.



DO
XIX WIEKU

Mechanizacja pracy: komputer I i II generacji

- Rozwój układu wieloprzestrzennego;
- Pracownicy znajdowali się w ogromnej przestrzeni ogólnej, a koordynatorzy na antresolach, dzięki czemu mogli nadzorować pracę z góry;
- Indywidualne gabinety najważniejszych osób w firmie;
- Praca w grupach roboczych;
- Nacisk położony na możliwość komunikowania się podczas pracy i zaspokajanie potrzeb społecznych.



KONIEC XIX WIEKU
DO LAT 20.
XX WIEKU



Dynamiczna automatyzacja: pierwsze komputery osobiste

- Praca w grupach i praca koncepcyjna;
- Upowszechnia się biuro „kombi”, bęglące skandynewską innowacją, która łączy zalety układu korytarzowego i wieloprzestrzennego;
- Budynek inteligentny, wyposażony w nowoczesne rozwiązania oraz systemy automatycznego zarządzania;
- Wzrost potrzeby komfortu, estetyki i odpoczynku w burze;
- Rezygnacja z dyscypliny na rzecz pracy reanormowanej.



LATA 60. I 70.
XX WIEKU



Narzędzia umożliwiające pracę i komunikację z każdego miejsca

- Żyrowawatory, inteligentny budynek biurowy - ekologiczny i sprzyjający rozwojowi społecznemu, ekonomicznemu oraz kulturowemu;
- Przestrzeń umożliwiająca dostosowanie miejsca pracy do zadań;
- Elastyczność i adaptowalność;
- Activity based working, praca zdalna, shared office oraz coworking;
- Niskie koszty utrzymania i niezawodność funkcjonowania;
- Współtworzenie oraz efektywność zamiast wydajności.



XXI WIEKU

Narzędzia pracy: telefon, maszyna do pisania i liczenia

- Układ wieloprzestrzenny w budynku, zmniejszający przestrzeń potrzebną na jednego pracownika w stosunku do układu korytarzowego;
- Kontrola, dyscyplina i rutyna w organizacji pracy;
- Jakość pracy zależy nie tylko od kontroli i zaangażowania pracowników, lecz także od warunków, narzędzi i możliwości odpoczynku oraz ergonomii.

Automatyzacja pracy: komputer III i IV generacji

- Biuro krajobrazowe;
- Praca zespołowa i indywidualna;
- Mniej formalny charakter przestrzeni biurowej;
- Próby ustalenia zapotrzebowania na przestrzeń biurową na stanowisku pracy w zależności od określonych czynności;
- Rosnące znaczenie lokalizacji biura, estetyki budynku i otoczenia.

Szybki rozwój elektroniki: urządzenia przenośne, wielofunkcyjne

- Praca w zespołach i indywidualna;
- Budynek inteligentny i ekologiczny;
- Akustyka i ograniczenie dystrakcji;
- Dodatkowe udogodnienia, takie jak pokoje nieformalnych spotkań, budki do rozmów telefonicznych;
- Rozmieszczenie pracowników według zakresu ich obowiązków;
- Praca niernormowana, telepraca.

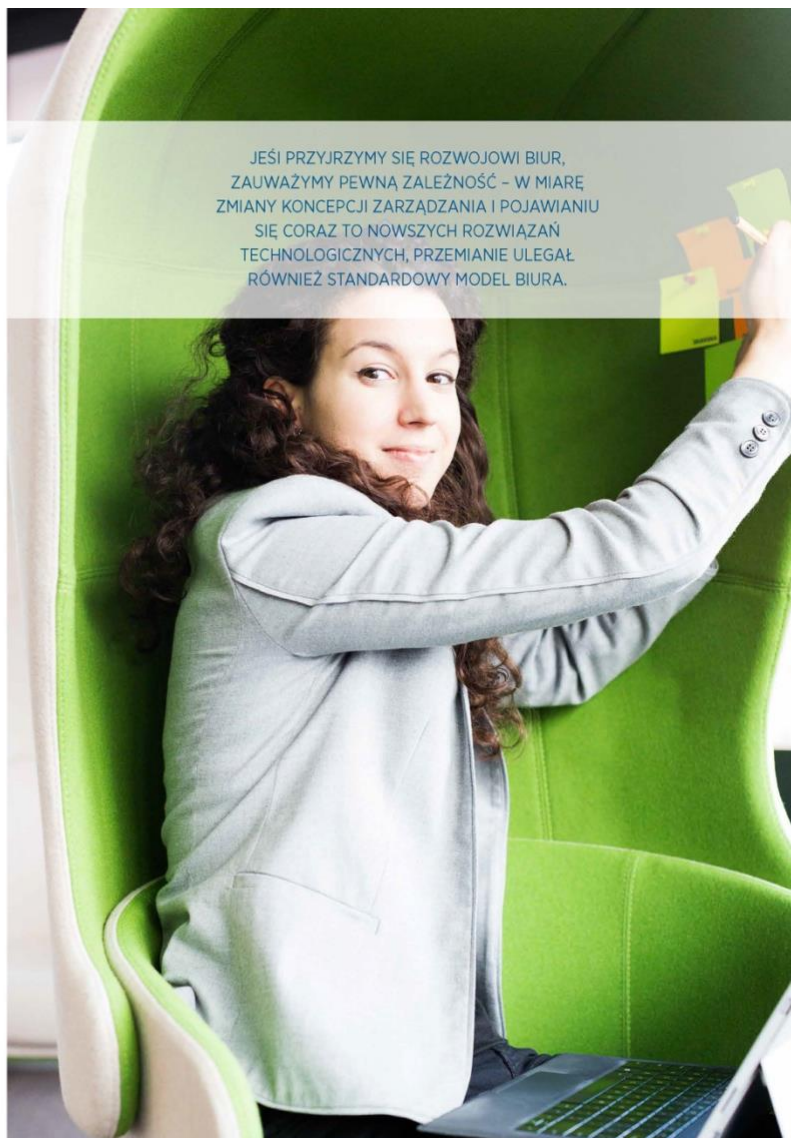


LATA 90. XX
WIEKU



Źródło: Opracowanie na podstawie E. Niezabitowska, Historia rozwoju budynku biurowego na przestrzeni XX w. w świetle nowych wyzwań organizacyjnych.

JEŚLI PRZYJRZYMY SIĘ ROZWOJOWI BIUR,
ZAUWAZAMY PEWNĄ ZALEŻNOŚĆ – W MIARĘ
ZMIANY KONCEPCJI ZARZĄDZANIA I POJAWIANIU
SIĘ CORAZ TO NOWSZYCH ROZWIĄZAŃ
TECHNOLOGICZNYCH, PRZEMIANIE ULEGAŁ
RÓWNIEM STANDARDOWY MODEL BIURA.



IDEALNI KANDYDACI DLA IDEALNYCH PRACODAWCÓW

Pracodawcy coraz częściej doświadczają trudności ze znalezieniem odpowiednich kandydatów do pracy, którzy spełniliby ich wymagania. Firmy wykorzystują nowe i niestandardowe metody dialogu z kandydatami, włączając w proces rekrutacyjny aktywność w mediach społecznościowych, grywalizację czy wykorzystanie specjalnych aplikacji. Walka o najbardziej utalentowanych pracowników trwa, a niektóre branże zmagają się z ogromnym niedoborem odpowiednich kandydatów na rynku pracy.

We wspólnym badaniu Hays, Kinnarps i Skanska pracodawcy odpowiedzieli na pytanie o najbardziej pożądane cechy i kompetencje nowo zatrudnionych pracowników.

Kompetencje, których szukają pracodawcy, w dużej mierze związane są ze zmianami zachodzącymi we współczesnym świecie. Ponieważ będziemy mieć do czynienia z ciągłymi transformacjami rynku pracy, pracownicy muszą być jednocześnie kreatywni i innowacyjni oraz pracowici i odpowiedzialni. Firmy

potrzebują nie tyle pracowników, co mikro-przedsiębiorców, którzy miejsce pracy będą traktować jak własną firmę oraz szybko odpowiadać na zmieniające się oczekiwania i otoczenie.

Obecnie coraz częściej mamy do czynienia z „turkusowymi firmami”, w których pracownicy z własnych wyborów angażują się w zadania i przydzielają sobie role dostosowane do indywidualnych umiejętności. Są w organizacji, ponieważ dobrze się w niej czują. W firmach, które opierają się na takim stylu zarządzania, często nie ma stanowisk, ale funkcje. Te ostatnie mogą być jednak zmieniane wraz ze zdobywaniem nowych umiejętności lub z powodu chęci spróbowania czegoś nowego. Także liczba godzin pracy może być ustalana indywidualnie przez pracownika ze wszystkimi jego wewnętrznymi kontrahentami. Jedynym ograniczeniem jest niezakończona działalność firmy. Activity based working to rozwiązanie, które wpisuje się również w specyfikę takich organizacji.

Firmy coraz chętniej myślą o środowisku pracy w ujęciu strategicznym. Dlaczego? Bo widzą, że biuro dopasowane do potrzeb pracowników poprawia komunikację i efektywność, wzmacnia współpracę oraz dzielenie się wiedzą. Komfort pracy przekłada się na lepszą realizację zadań, która z kolei gwarantuje coraz lepsze wyniki finansowe. Punktem wyjścia do rozważań o sposobie pracy powinno być zdefiniowanie tego, co tworzy wartość w danej organizacji, jak również położenie nacisku na rozwiązania, które sprzyjają zadowoleniu pracowników.

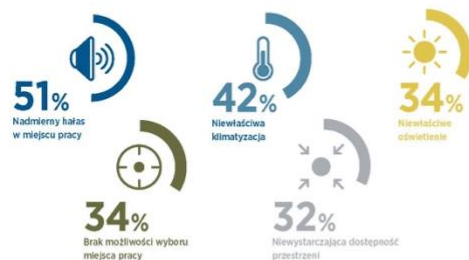
Regina Gul
Starszy Kierownik
Projektu,
JLL Poland



CO NAM PRZESZKADZA?

Mimo skutecznego podążania za trendami, pracownikom biur od lat doskwierają te same niedogodności, które można zaadresować już na etapie wyboru powierzchni biurowej i aranżacji przestrzeni. Jako kwestie problematyczne niezmiennie wskazywany jest poziom hałasu, stan klimatyzacji, brak światła dziennego i ograniczona przestrzeń.

NIEDOGODNOŚCI W MIEJSCU PRACY



Zródło: Badanie Hays Poland, Nadgodziny, 2016.

Obciążenie pracą i jej intensywność powodują, że pracownikom często towarzyszy stres i zmęczenie. Dodatkowo, jak pokazują wyniki badania Hays Poland, większość zatrudnionych pracuje w nadgodzinach, a czas wykraczający ponad standardowe osiem godzin, wpływa negatywnie na samopoczucie i zdrowie. Pracownicy cierpią na pogorszenie koncentracji, kłopoty ze snem i bóle różnego rodzaju.



Maciej Zdrowski
SzeF Zespołu ds. Oceny Środowiska Pracy, Główny Ergonomista, Medcover

Jeśli każdego dnia pracownicy spędzają wiele godzin siedząc w jednej pozycji, na stanowisku, które nie zostało przygotowane zgodnie z zasadami ergonomii, może to skutkować poważnymi problemami zdrowotnymi. Jednocześnie, badania jednoznacznie wskazują pozytywny wpływ warunków pracy na kreatywność. Oznacza to, że warto tworzyć odpowiednie warunki pracy, by korzystać z wiedzy i wzmacniać potencjał swojego zespołu. Wymaga to zrozumienia i procesowego podejścia, gdzie stworzenie zróżnicowanej przestrzeni i różnorodnej gamy narzędzi daje pracownikom możliwość wyboru jak chcą pracować, by być najbardziej efektywnymi i twórczymi, przy jednoczesnej trosce o ich zdrowie i samopoczucie.

Intensywne wykonywanie obowiązków zawodowych prowadzi do wielu dolegliwości obniżających komfort pracy i życia. Pracownicy coraz częściej twierdzą, że do ich dolegliwości przyczynia się niski standard biura. Bóle pleców, głowy i ramion, dyskopatia, zespół cieśni kanału nadgarstka, kłopoty z krążeniem – to dolegliwości, które są bezpośrednim skutkiem niewygodnego środowiska pracy lub braku wyboru miejsca pracy.



Nie bój się Activity Based Working | 39

Podstawowe pojęcia

Światło, nazywane inaczej promieniowaniem widzialnym, to energia promieniowania o długości fali 380-760 nm, zdolna pobudzić siatkówkę i wywołać wrażenie wzrokowe. Parametr określający całkowitą moc światła emitowanego z danego źródła to strumień świetlny. Strumieniem świetlnym nazywamy część promieniowania emitowanego przez źródło światła widziana przez oko ludzkie w jednostce czasu. Jednostką strumienia świetlnego jest lumen [lm]. Wielkością określającą ilość światła wychodzącego ze źródła światła lub oprawy w ściśle określonym kierunku jest światłość. Liczona jest ona jako iloraz strumienia świetlnego Φ wysyłanego przez źródło w elementarnym kącie bryłowym ω zawierającym dany kierunek, do wartości tego elementarnego kąta. Jednostką światłości jest kandela [cd]. Natężenie światła to wyrażany w luksach stosunek wielkości strumienia świetlnego padającego na płaszczyznę do jej pola powierzchni. Wynika z tego, że $1lx = 1lm / m^2$

Polska norma PN-EN 12 464-1: 2004

W 2004 roku opublikowana została do normalizacji w Polsce nowa norma, dotycząca oświetlenia wnętrz PN-EN 12464-1: 2004 "Światło i oświetlenie. Oświetlenie miejsc pracy. Część 1: Miejsca pracy we wnętrzach". Choć zgodnie z zapisem ustawy o normalizacji stosowanie Polskich Norm jest dobrowolne, to w świetle zapisów rozporządzenia o ogólnych przepisach bezpieczeństwa i higieny pracy oraz rozporządzenia w sprawie bezpieczeństwa i higieny pracy na stanowiskach wyposażonych w monitory ekranowe wymagania normy PN-EN 12464-1:2004 są dla pracodawcy wymaganiami obligatoryjnymi. Norma nie określa wymagań oświetleniowych dla całego pomieszczenia, ale rozważa poszczególne miejsca pracy w pomieszczeniu, również i te, które wiążą się z trasami przejść, transportu wewnętrznego, itp.

Definicje

zadanie wzrokowe - elementy wzrokowe wykonywanej pracy, takie jak wymiary przedmiotu, jego luminacja, kontrast z tłem i czas trwania;

pole zadania - fragment pola w miejscu pracy, gdzie wykonywane jest zadanie wzrokowe. W miejscach, dla których rozmiar i/lub lokalizacja zadania nie jest znana, za pole zadania należy przyjąć pole, w którym zadanie to może być wykonywane

pole bezpośredniego otoczenia - pas o szerokości co najmniej 0,5m, otaczający pole zadania, występujący w polu widzenia

eksploatacyjne natężenie oświetlenia (Em) - najniższa wartość średniego natężenia oświetlenia, zalecane do utrzymania podczas użytkowania oświetlenia.

Kryteria przy projektowaniu oświetlenia

Do podstawowych parametrów określających otoczenie świetlne w normie zaliczono: natężenie oświetlenia, rozkład luminacji, olśnienie, kierunkowość światła, oddawanie barw i wygląd barwy światła, migotanie.

Natężenie światła

Poziom natężenia oświetlenia i jego rozkład w polu zadania wzrokowego i jego otoczeniu mają zasadniczy wpływ na szybkość i sposób realizacji zadań wzrokowych. Średnie natężenie oświetlenia dla dowolnego zadania wzrokowego nie może być niższe od wartości eksploatacyjnych podanych w tabelach, niezależnie od wieku i stanu instalacji oświetleniowej. W omawianej normie przyjęto, że wymagane natężenie oświetlenia w celu dostrzeżenia rysów ludzkiej twarzy w normalnych warunkach oświetleniowych, powinno być nie mniejsze niż 20 lx. Przykładowe prace i związane z nimi parametry oświetleniowe w polu zadania wzrokowego zawiera tabela poniżej. Jeśli wykonywana praca jest krótkotrwała lub przedmioty pracy są duże, projektant ma prawo obniżyć wymagania oświetleniowe o jeden stopień wg skali 20 - 30 - 50 - 75 - 100 - 150 - 200 - 300 - 500 - 750 - 1000 - 1 500 - 2 000 - 3 000 - 5000 lx (tj. np. z 500 lx na 300). Projektant może też wartości te podwyższyć, jeśli wykonywana praca wzrokowa jest skrajnie trudna, zdolność widzenia pracowników jest gorsza niż normalna (ludzie starsi) czy też przedmioty pracy wzrokowej mają wyjątkowo małe rozmiary lub małą wartość kontrastu.

Rodzaj wnętrza, zadania	Em	UGR	Ra	Uwagi
Segregowanie, kopiowanie	300	19	80	
Pisanie ręczne, pisanie na maszynie, czytanie obsługiwane klawiatury, przetwarzanie danych	500	19	80	odnośnik do rozdziału normy dotyczącego pracy z komputerem
Kreślarnie	750	16	80	
Stanowiska projektowania wspomagane komputerowo	500	19	80	odnośnik do rozdziału normy dotyczącego pracy z komputerem
Sale posiedzeń i konferencyjne	500	19	80	oświetlenie powinno być regulowane

UGR oznacza wartość graniczną ujednoczonego wskaźnika ośnienia

Rodzaj wnętrza, zadania	Em	UGR	Ra
Kucie swobodne	200	25	60
Spawanie	300	25	60
Montaż: zgrubny średni dokładny precyzyjny	200 300 500 750	25 25 22 19	80
Pisanie ręczne, pisanie na maszynie, czytanie obsługiwane klawiatury, przetwarzanie danych	500	19	80
Wyrób narzędzi, wzorników, szablonów, przyrządów do obróbki, mechanika precyzyjna, mikromechanika	1 000	19	80

UGR oznacza wartość graniczną ujednoczonego wskaźnika ośnienia

Natężenie światła w obszarze otoczenia zadania wzrokowego powinno być zgodne z tabelą.

Obszar zadania [lx]	Obszar bezpośredniego otoczenia zadania wzrokowego [lx]
≥ 750	500
500	300
300	200
≤ 200	E obszaru zadania wzrokowego

Rozkład luminacji

Luminancja to fizyczna miara jasności. Luminacje wszystkich powierzchni można z uproszczeniem określić przy pomocy współczynnika odbicia i natężenia oświetlenia na tej powierzchni. Zaleca się następujące zakresy współczynników odbicia:

- sufit: 0,6 - 0,9
- ściany: 0,3 - 0,8
- podłoga: 0,1 - 0,5
- płaszczyzna pracy: 0,2 - 0,6.

Równomierność

Równomierność natężenia oświetlenia to stosunek natężenia minimalnego do natężenia średniego. W obszarze zadania wzrokowego równomierność powinna być jak najlepsza, ale nie mniejsza niż 0,7. Natomiast równomierność natężenia oświetlenia w polu bezpośredniego otoczenia nie może być niższa od 0,5.

Olśnienie

Olśnienie to warunki widzenia powstałe na skutek niewłaściwego rozkładu, bądź zakresu luminancji, bądź też występowania zbyt dużych kontrastów, powodujące uczucie przykrości i niewygodę lub obniżenie zdolności rozpoznawania szczegółów, lub przedmiotów, lub oba te wrażenia jednocześnie. Norma rozróżnia olśnienie przykre, czyli bezpośrednie, pochodzącego bezpośrednio od źródeł światła, i olśnienie przeszkadzające, czyli odbiciowe. Na stanowiskach pracy znajdujących się we wnętrzach najczęstszą przyczyną powstawania olśnienia przykrego są jaskrawe elementy opraw oświetleniowych lub okna. Jeśli spełnione są warunki ograniczenia olśnienia przykrego, olśnienie przeszkadzające nie stanowi zazwyczaj większego problemu. Dlatego w normie przyjęto jako wystarczająco skuteczne ograniczenie olśnienia przykrego, poprzez ograniczenie wartości ujednoczonego wskaźnika olśnienia (UGR) według metody CIE wg wzoru:

gdzie:

L_b – luminancja tła mierzona w cd/m^2 ,
 L – luminancja świecących części oprawy w kierunku oka obserwatora, mierzona w cd/m^2
 ω – kąt bryłowy, w którym oko obserwatora widzi świecące części każdej oprawy

p – wskaźnik położenia uwzględniający położenie każdej oprawy względem linii widzenia.

Norma uznaje, że jeśli projekt wykonany jest w taki sposób, by wartości UGR dla dowolnego naturalnego położenia użytkownika pomieszczenia nie przekroczyły wartości określonej w normie, to instalacja oświetleniowa jest wystarczająco zabezpieczona nie tylko przed groźbą wystąpienia olśnienia przykrego, ale także przed olśnieniem przeszkadzającym. Przykładowe maksymalne wartości UGR zawierają tabele powyżej.

Środki ochrony przed olśnieniem bezpośrednim:

- Stosowanie elementów konstrukcyjnych opraw osłaniających źródła światła
- Użycie żaluzji i rolet.
- Minimalny kąt ochrony dostosowany do luminancji źródeł światła

$$UGR = 8 \log_{10} \left(\frac{0,25 \sum L^2 \omega}{L_b P^2} \right)$$

Środki ochrony przed olśnieniem dekontrastującym i odbiciowym:

- właściwie rozmieszczanie opraw oświetleniowych i stanowisk pracy
- preferowanie matowych powierzchni
- ograniczanie luminancji opraw
- zwiększanie powierzchni świecących opraw
- malowanie na jasno sufitów i ścian.

Oświetlenie kierunkowe

Oświetlenie z wybranych kierunków można stosować w celu ułatwienia wykonywania zadań wzrokowych. Uwidocznia ono szczegóły zadania wzrokowego. Należy unikać odbić dekontrastujących i olśnienia odbiciowego, zgodnie z przedstawionymi zasadami.

Aspekty barwne

Cechy barwne źródeł światła emitujących światło o barwie bliskiej do białej, opisane są za pomocą dwóch niezależnych właściwości:

- barwy światła emitowanej przez samo źródło (barwa postrzegana) określanej przez temperaturę barwową wyrażaną w Kelwinach (K). Przyjęto następujące zakresy temperatury barwowej:
 - ciepła, poniżej 3 300 K
 - pośrednia, od 3 300 do 5 300 K
 - chłodna (zimna), powyżej 5 300 K.
- zdolności oddawania barw – wpływu na wygląd przedmiotów oświetlanych przez to źródło wyrażanej przez wskaźnik oddawania barw – Ra. Wartością maksymalną Ra jest 100, co odpowiada barwie światła naturalnego. Wartość Ra

maleje wraz ze spadkiem jakości oddawania barw. Do oświetlenia wnętrz, w których człowiek przebywa przez cały czas pracy, należy stosować źródła światła zapewniające oddawanie w sposób naturalny i wierny barw przedmiotów i skóry ludzkiej, czyli o wskaźniku oddawania barw nie niższym niż 80. Minimalne wartości Ra na wybranych stanowiskach zawierają tabele powyżej

Tętnienie i efekty stroboskopowe

Tętnienie (inaczej migotanie) to zmiana natężenia źródła światła spowodowana zmianami prądu przemiennego. Zjawisko to jest z reguły niedostrzegalne gołym okiem, ale powoduje zmęczenie narządu wzroku. Skutkiem tętnienia jest także efekt stroboskopowy polegający na uzyskaniu efektu pozornego bezruchu elementów ruchomych np. skrzydeł wentylatora. W PN-EN podano, że należy unikać efektów stroboskopowych, np. przez stosowanie zasilania żarówek prądem stałym lub zasilania żarowych lub wyładowczych źródeł światła napięciem o wysokiej częstotliwości (około 30 kHz).

Permissible sound level values at the workplace. Standard PN-B-01307:1994

Polska Norma PN-B-01307:1994 „Dopuszczalne wartości poziomu dźwięku na stanowisku pracy” określa maksymalne, dopuszczalne ze względu na ochronę słuchu poziomy hałasu na stanowisku pracy:

$L_{ex,8h}$ (poziom ekspozycji na hałas) < 85 dBA (65 dBA dla kobiet w ciąży)

L_{Amax} (maksymalny poziom dźwięku A) < 115 dBA

L_{Cpeak} (szczytowy poziom dźwięku C) < 135 dB

Wymagania powyższe na podstawie Rozporządzenia Ministra Pracy i Polityki Socjalnej w sprawie wprowadzenia obowiązku stosowania niektórych Polskich Norm dotyczących bezpieczeństwa i higieny pracy z 1.12.1998 są obowiązkowe.

Norma zaleca też maksymalne poziomy hałasu na stanowisku pracy ze względu na możliwość niezakłóconego wykonywania pracy.

L_{Aeq} (równoważny poziom dźwięku) ≤ 55 dBA – w pomieszczeniach: administracyjnych, biur projektowych, do prac teoretycznych, opracowywania danych i innych, o podobnym przeznaczeniu

L_{Aeq} (równoważny poziom dźwięku) ≤ 65 dBA – W kabinach dyspozytorskich, obserwacyjnych i zdalnego sterowania z łącznością telefoniczną używaną w procesie sterowania, w pomieszczeniach do wykonywania prac precyzyjnych i w innych pomieszczeniach o podobnym przeznaczeniu

L_{Aeq} (równoważny poziom dźwięku) ≤ 75 dBA – W kabinach bezpośredniego sterowania bez łączności telefonicznej, w laboratoriach ze źródłami hałasu, w pomieszczeniach z maszynami i urządzeniami liczącymi, maszynami do pisania, dalekopisami i w innych pomieszczeniach o podobnym przeznaczeniu